FISH KILLS' HIDDEN LINK: HOW ANIMAL FEEDING OPERATIONS HURT FLORIDA'S COASTAL BUSINESSES

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I. INTRODUCTION

Picture yourself at a quintessential Florida beach, say, St. Pete Beach. You hear palm trees swaying in the wind, you feel the sun warming your skin, you see water lazily wash up onto shore, you hear children happily splashing and playing. But, upon a closer look, you see a dead fish wash up onto shore. A minute later, another dead fish washes up. Then you see another, and another. So many dead fish wash onto shore that they start to block your view of the waves. Your throat begins to burn. Your eyes start to water. If you continued to sit there, you could watch, literally, tons of dead fish pile up. But, of course, the rotting smell drives you away.

This sickening scene is not fantasy, and, sadly is becoming increasingly common in Florida. Spanish explorers remarked on Florida's algal blooms, called "red tides," in the 1500s.[1] They are naturally occurring phenomena, and historically, there were many years between red tides.[2] But, increasing water pollution is causing red tides to occur more frequently, stay onshore longer, and increase in geographic extent.[3] Red tides kill marine life that then litter beaches.[4] In July 2022, over the course of one day, St. Petersburg cleanup teams collected nine tons of dead fish.[5]

Across the state, red tides can cause billions in economic loss. Economic impact is so extensive because they trigger recreation and tourism losses, commercial fishing losses, monitoring and management costs, and public health costs. The St. Petersburg and Clearwater visitors' bureau estimated that the area lost $240 million from a single red tide in 2005.[6]

That is why governmental agencies closely track water quality to predict red tides and ensuing fish kills. This is particularly true in coastal towns, where economies depend on beaches. While local governments and media explain

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[1] Danielle Hall, *What Exactly Is a Red Tide?*, OCEAN (Aug. 2018), https://ocean.si.edu/ocean-life/plants-algae/what-exactly-red-tide.

[2] *See* SARASOTA HERALD-TRIB., *Red-tide timeline* (July 16, 2006, 9:06 AM), https://www.heraldtribune.com/story/news/2006/07/16/red-tide-timeline/28564944007/.

[3] Sara E. Kuhar, Kate Nierenberg, Barbara Kirkpatrick & Graham A. Tobin, *Public Perceptions of Florida Red Tide Risks* (Jan. 4, 2010), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2801421/.

[4] *Id.*

[5] Max Chesnes, *1,500 Pounds of Dead Fish Cleared from St. Pete Beach Over Weekend as Red Tide Looms*, TAMPA BAY TIMES (Dec. 12, 2022), https://www.tampabay.com/news/environment/2022/12/12/red-tide-florida-2022-pinellas-county-fish-kills/.

[6] Frank Alcock, *An Assessment of Florida Red Tide: Causes, Consequences and Management Strategies*, MOTE (Aug. 2007), https://mote.org/media/uploads/files/MPI_RedTideAssessment-2007-Final.pdf.

that fish kills are caused by red tides, they fail to educate citizens on what feeds red tides—nitrogen and phosphorus discharged by animal feeding operations. According to Florida's Fish and Wildlife Conservation Commission, there is "no practical and acceptable way to control or kill red tide blooms."[7] But this is simply not true. Florida can stop feeding red tides by limiting its food source.

Instead, at the federal and state level, water pollution laws allow animal feeding operations to oversaturate water with nutrients like nitrogen and phosphorus. This is allowed with little regard to its known impacts, including fish kills that drive consumers away from beaches. While local businesses suffer the consequences of fish kills; legislators keep agricultural exemptions in law; administrators permit polluters; and media outlets direct attention away from red tides' true cause.

This paper proposes that agricultural water pollution should be further limited. As water pollution laws have thus far failed to adequately guard against nutrient pollution, despite abundantly available regenerative agricultural models, this three-part solution aims to empower citizens and the business industry to hold animal feeding operations accountable. To that end, this paper proposes: (1) expanding Florida's Red Ride Task Force; (2) educating citizens via a media campaign; and (3) mandating feeding operations participate in Florida's now voluntary Environmental Stewardship Certification Program.

Part II of this paper describes the scientific process whereby discharge from animal feeding operations causes Florida's fish kills. It also explains the immense economic impact that fish kills have on Florida's coastal economies. Next, Part III analyzes the legal mechanisms that regulate water pollution at the federal and state levels. It further analyzes the effectiveness of those controls on curbing the negative impacts from agricultural nutrient pollution. Finally, Part III details a three-part solution to address the lack of nutrient pollution regulation by prioritizing community awareness of the links between animal feeding operations, fish kills, and coastal businesses that are stymied by polluters.

[7] Madeline Halpert, *Red tide is back and killing fish on south-western Florida beaches*, BBC (Mar. 7, 2023), https://www.bbc.com/news/world-us-canada-64869979.

II. BACKGROUND

A. ANIMAL FEEDING OPERATIONS POLLUTE FLORIDA'S WATERS

In the past few decades, livestock farming has undergone a significant transformation.[8] Production has shifted from smaller, family-owned farms to industrial-sized operations that produce massive amounts of waste.[9] The most pressing public health issue associated with modern animal feeding operations is the amount of manure (*i.e.* waste) that they produce.[10]

Now, livestock operations are separated into three size-based categories: (1) the largest are Concentrated Animal Feeding Operations, (2) the mid-size are Animal Feeding Operations, and (3) the smallest are simply "farms." Concentrated Animal Feeding Operations are distinguished from Animal Feeding Operations based on higher concentrations of animals and how their waste is disposed of.[11] Animal Feeding Operations are defined as lots or facilities that: (1) confine animals for at least forty-five days per year, and (2) do not maintain vegetation on any portion of the facility in the normal growing season.[12] Practically, that means animals are confined in pens and have no access to pasture, grass, nor other vegetation.[13] Given the cramped conditions that operators impose upon the animals, everything is condensed, including their waste.[14] "Farms" are smaller operations that do not fit into either definition.

Depending on the type and number of animals on a farm, typical manure production can range between 2,800 tons and 1.6 million tons a year.[15] That is a difficult amount to conceptualize. For comparison, one large feeding operation can produce more waste than an entire city.[16] A feeding operation with 800,000 pigs, producing over 1.6 million tons of waste a year, would have more waste than that produced by all of Philadelphia.[17] America's livestock animals produce somewhere between three and twenty times more waste than America's people do.[18]

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[8] Carrie Hribar, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities*, NALBOH (2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.
[9] *Id.*
[10] *See id.*
[11] *See* 40 C.F.R. § 122.23(b)–(c) (2023).
[12] *See* § 122.23(b)(1) (2023).
[13] *See Animal Feeding Operations (AFOs)*, EPA, https://www.epa.gov/npdes/animal-feeding-operations-afos (last visited Dec. 18, 2023).
[14] *See* Water Resources Mission Area, *Agricultural Contaminants*, USGS (Mar. 1, 2019), https://www.usgs.gov/mission-areas/water-resources/science/agricultural-contaminants.
[15] CARRIE HRIBAR, UNDERSTANDING CONCENTRATED ANIMAL FEEDING OPERATIONS AND THEIR IMPACT ON COMMUNITIES 2 (Mark Schultz ed., 2010), https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf.
[16] *Id.*
[17] *Id.*
[18] *Id.*

That manure can be valuable to farms, but the quantities produced by feeding operations becomes quite problematic.[19] When farming was smaller and farmers had both crops and animals, all their waste could be used as a crop fertilizer.[20] But many farms are now single-species, so farmers cannot use all the manure they produce as fertilizer.[21] For animal feeding operations that must contend with tons of waste, modern waste management falls into four general categories: applying it to land, spraying it onto fields, storing it, and trucking it off-site.[22]

First, land application of untreated waste is a common disposal method because it is so inexpensive.[23] Second, spraying involves pumping liquefied waste onto fields as a fertilizer, often onto crops for that are destined for human consumption.[24] Both of these methods suffer from similar faults —when waste is applied too frequently or in too large a quantity, its nutrients overwhelm the soil's absorptive capacity.[25] Nitrogen and phosphorus from the waste then either runoff in stormwater or are leached into groundwater.[26]

In the third category, operators store waste indefinitely or for later use.[27] Storage occurs under buildings that hold animals, in clay or concrete pits, or in outdoor ponds colloquially called "lagoons."[28] Storage units are ineffective at containing waste because they overflow from rainwater, leach nutrients into groundwater, and become faulty.[29] Leaching and breakage occur more often than they should because not all lagoons are required to be lined.[30] Finally, trucking waste off-site allows waste to be managed in the first three categories, just at a different location.[31]

Once nutrients enter groundwater, stormwater, or surface water, they eventually make their way to the Gulf of Mexico and the Atlantic Ocean.[32] Through

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[19] *Id.*

[20] *See id.* ("Many farms no longer grow their own feed, so they cannot use all the manure they produce as fertilizer.").

[21] *See* HRIBAR, *supra* note 15.

[22] *Id.* at 2–3.

[23] *Id.* at 2.

[24] *See id.* at 3.

[25] *Id.*

[26] *See Nutrient Pollution: Sources and Solutions*, EPA, https://www.epa.gov/nutrientpollution/sources-and-solutions (last visited Dec. 18, 2023) (explaining that agricultural activities and storm water run-off contribute to nitrogen and phosphorus waste). *See generally* HRIBAR, *supra* note 15, at 3 (explaining that over application of waste can overload the soil with nitrogen and phosphorus, and those nutrients can run off or leach into the groundwater).

[27] *See* HRIBAR, *supra* note 15.

[28] *Id.* at 3.

[29] *Id.*

[30] *See Dairy Best Management Practices*, FLA. DEP'T. OF AGRIC. & CONSUMER SERV. (2015), https://ccmedia.fdacs.gov/content/download/64582/file/dairyBMPFinal.pdf.

[31] *See* HRIBAR, *supra* note 15, at 3.

[32] *See generally id*. ("When manure is applied too frequently or in too large a quantity to an area, nutrients overwhelm the absorptive capacity of the soil, and either run off or are leached into the groundwater.").

these customary methods of waste management, nutrient pollution is substantial and habitual, not unusual. In states with more concentrated animal feeding operations, waste management is responsible for twenty to thirty serious water quality problems each year.[33]

B. NUTRIENT POLLUTION IS RED TIDES' PERFECT FOOD

Red tides are a harmful algal bloom appearing in higher-than-normal concentrations.[34] Their name stems from their tendency to discolor water red.[35] Many algal species contribute to red tides, with the most prevalent in Florida being a phytoplankton called *Karenia brevis*.[36]

K. brevis tolerates a wide range of temperatures and salinity levels, but thrives in high-salinity water.[37] Its life cycle occurs in four stages: initiation, growth, maintenance, and termination.[38] Initiation is believed to occur offshore and is not caused by nutrient pollution.[39] *K. brevis'* growth rate is slow when compared to other species of phytoplankton; *K. brevis* cells typically undergo one cell division every two to three days whereas other species undergo three to four divisions every day.[40] A *K. brevis* bloom will typically develop in deeper water before migrating to the surface.[41] During the maintenance phase, it often appears that small red tide blooms move inshore, then rapidly increase in scope and intensity.[42]

It is during the growth and maintenance phases that nutrient pollution so significantly contributes to *K. brevis*' expansion. The major nutrients that *K. brevis* uses for growth are nitrogen and phosphorus.[43] When nutrient pollution causes higher than normal concentrations of nitrogen and phosphorus, red tide growth conditions are optimized.[44]

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[33] *Id*. at 4.
[34] *About Red Tides in Florida*, FLA. FISH & WILDLIFE CONSER. COMM'N, https://myfwc.com/research/redtide/general/about/ (last visited Dec. 18, 2023).
[35] *Id.*
[36] *Id.*
[37] *See id.*
[38] *See id.*
[39] *See* Frank Alcock, *An Assessment of Florida Red Tide: Causes, Consequences and Management Strategies*, MOTE MARINE LAB'Y 1, 1 (Aug. 2007), https://mote.org/media/uploads/files/MPI_RedTideAssessment-2007-Final.pdf.
[40] *See id*. at 3.
[41] *See id*.
[42] *See id.* at 5.
[43] *See What Forms of Nutrients can Karenia Brevis Use to Grow and Bloom?*, FLA. FISH & WILDLIFE CONSER. COMM'N, https://myfwc.com/research/redtide/research/current/richardson/ (last visited Dec. 18, 2023).
[44] *See generally id.* (noting that nitrogen and phosphorus are major nutrients used to grow the red tide organism, *Kerenia brevis*).

C. RED TIDES CAUSE FISH KILLS

Succinctly put, red tides suffocate marine life. More comprehensively put, red tides cause eutrophication that is incompatible with marine life. Eutrophication is the process whereby a waterbody that is excessively enriched with nutrients results in the depletion of dissolved oxygen.[45] This occurs in an exponential process: (1) red tides feed microbes that consume oxygen, (2) eutrophic water kills marine life that, in turn, creates more nutrients for red tides to feed on, and (3) red tide blooms block sunlight from reaching aquatic plants.[46]

In the first stage, individual *K. brevis* die and become a feast for microbes.[47] As microbes, like animals, require oxygen to live, their multiplication depletes already-present oxygen from the ocean.[48] In the second stage, oxygen-depletion causes marine life to suffocate.[49] As dead marine life decomposes it releases more nutrients for red tide growth, leading to more *K. brevis*.[50]

In the third stage, blankets of red tide block sunlight from aquatic plants, causing them to die.[51] Fish breath oxygen produced by aquatic plants.[52] With less plants and more microbes, there is less oxygen and fish suffocate. The suffocation process that a fish experiences in oxygen-depleted water is similar to what humans experience when asphyxiating from smoke near a fire.

D. FISH KILLS HURT FLORIDA'S BUSINESSES AND COASTAL ECONOMIES

Florida's coastal economies are dependent upon the accessibility and desirability of their beaches. On Florida's tourism website, beaches are the preeminent attraction.[53] Importantly, beach economies are not limited to the sand and water itself. Tourists use hotels and individually owned short-term rentals. Residents use apartments and homes. Both use restaurants, grocery stores, medical care, surf shops, event spaces, malls, etcetera. If there is a point of sale, beachgoers use it. If people do not live at or visit the beach, all those industries suffer.

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[45] *See What is Eutrophication?*, NAT'L OCEAN SERV., https://oceanservice.noaa.gov/facts/eutrophication.html (last visited Dec.18, 2023).
[46] *See* Danielle Hall, *What Exactly Is a Red Tide?*, SMITHSONIAN (Aug. 2018), https://ocean.si.edu/ocean-life/plants-algae/what-exactly-red-tide.
[47] *See id.*
[48] *See id.*
[49] *See id.*
[50] *See id.*
[51] *See id.*; *see also* Jess Thomson, *Florida's Red Tide Is Decimating Marine Plants*, NEWSWEEK (Apr. 3, 2023, 6:16 AM), https://www.newsweek.com/seagrass-florida-red-tide-manatees-dying-1792128 ("During large blooms, the algae of the red tides can grow to form large mats, blocking the sunlight from reaching the plants growing on the seabed, causing them to die and eventually rot, further feeding the algal bloom.").
[52] *See* Hall, *supra* note 1.
[53] *See, e.g.*, VISIT FLA, https://www.visitflorida.com/ (last visited Dec. 18, 2023).

When red tides were infrequent and short lasting, those that did occur would peak in late summer and then quickly subside.[54] But year-long blooms that cover all tourist seasons are becoming more frequent.[55] Red tide blooms can now last for eighteen consecutive months.[56] As pollution-fed blooms become larger, more frequent, and last longer, they have a greater impact on people's choice to visit or live near beaches.

III. ANALYSIS

A. POLLUTION FROM ANIMAL FEEDING OPERATIONS IS NOT WELL REGULATED

Agriculture is the leading source of water pollution in the United States' rivers and lakes.[57] And nutrient pollution's negative impact on aquatic environments is well-known, which led to anti-pollution laws such as the Clean Water Act.[58] But baked into those anti-pollution laws are exemptions and limitations that make them woefully ineffective.[59]

First, only the largest animal feeding operations are regulated. Less-massive operations are exempt from federal coverage and left to their states to regulate (or not). Second, animal feeding operations are allowed to pollute. True, they must apply for permits, and may be subjected to limitations through those permits, but their pollution is not prohibited. Third, their external impacts and not internalized. Instead, operations push their pollution onto others to deal with.

As a result of animal feeding operations' nutrient pollution fish kills ensue and coastal businesses are harmed. Consequently, more regulation is needed to prevent animal feeding operations' from avoiding their own business expenses and instead, pressing them onto others.

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[54] *See* Josie Fischels, *At Least 600 Tons Of Dead Fish Have Washed Up Along Tampa Bay's Shore*, NPR (July 13, 2021, 3:18 PM), https://www.npr.org/2021/07/13/1015312707/a-summer-red-tide-has-left-hundreds-of-tons-of-dead-fish-along-tampa-bays-shore.

[55] *See id*. (highlighting how bloom generally begin in the fall and go away by January, but recently have begun to occur frequently during the summer months).

[56] *See* Hall, *supra* note 1

[57] *See* Water Resources Mission Area, *Agricultural Contaminants*, USGS (Mar. 1, 2019), https://www.usgs.gov/mission-areas/water-resources/science/agricultural-contaminants ("Pesticides are widespread in surface water and groundwater across the United States. For example, at least one pesticide was found in about [94%] of water samples and in more than 90 percent of fish samples taken from streams across the Nation, and in nearly [60%] of shallow wells sampled.").

[58] *See History of the Clean Water Act*, TUL. UNIV. L. SCH. (June 15, 2021), https://online.law.tulane.edu/blog/clean-water-act-history (describing how various contemporary issues made headlines and led to the Act being passed, such as a massive fish kill in one Florida lake, and the bacteria levels in the Hudson River).

[59] *See also* Jake Moore, *The Clean Water Act's Midlife Crisis*, CTR FOR PROGRESSIVE REFORM (Apr. 22, 2022), https://progressivereform.org/cpr-blog/clean-water-acts-midlife-crisis/ (describing how the act fails to adequately regulate nonpoint source pollution, and how current levels of funding are not enough to properly curb and regulate pollution).

B. THE REGULATORY COVERAGE OF AGRICULTURAL POLLUTION

The Federal Water Pollution Control Act, better known as the Clean Water Act, is the United States' preeminent water pollution law. Its purpose is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[60] That integrity includes the protection of fish, shellfish, and wildlife and provides for recreation in and on the water.[61]

When enacting the Clean Water Act, Congress set the lofty goal of eliminating water pollution by 1985.[62] To do so, the Act regulates discharges of pollutants into navigable waters and sets quality standards for surface waters.[63] Relevant to agricultural pollution, regulation is thus split into two categories: (1) permitting discharges for point sources, and (2) setting total maximum daily loads for nonpoint sources.[64] Because only some animal feeding operations are regarded as point sources, regulation of an individual operation is generally under only one of those categories.

i. Permitting Discharges

Concentrated Animal Feeding Operations are regulated under the permitting category of the Clean Water Act, through the National Pollutant Discharge Elimination System, administered by the Environmental Protection Agency. Under the Act, "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, ***concentrated animal feeding operation***, or vessel or other floating craft, from which pollutants are or may be discharged.[65]

Notably, the term "concentrated animal feeding operation" was included in the 1972 definition of "point source," even though the term itself was undefined.[66] In the decades since, agriculture has undergone major changes whereby operations are larger and more concentrated.[67] Now, one Concentrated Animal Feeding Operation alone confines five million laying hens.[68] This size operation would have been unheard of in 1972. The Environmental Protection

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[60] 33 U.S.C. § 1251(a) (1948).
[61] *See* § 1251(a)(2) (declaring that an interim goal of water quality regulation is the protection of fish, wildlife, and shellfish).
[62] *See* § 1251(a)(1) ("[I]t is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985.").
[63] *See* § 1251 (requiring that all governmental and public entities comply with the regulatory standards set forth by the policy which encompass the full breadth of the Nation's waters).
[64] *See* 33 U.S.C. § 1251 (a)(7)-(b).
[65] 33 U.S.C. § 1362(14) (emphasis added).
[66] *See AFOs and CAFOs*, NPDES PERMIT WRITERS' MANUAL FOR CAFOS, https://www3.epa.gov/npdes/pubs/cafo_permitmanual_chapter2.pdf (last visited Dec. 18, 2023).
[67] *See Animal Waste and Hazardous Substances: Current Laws and Legislative Issues*, CONG. RSCH. SERV. (June 3, 2016), https://crsreports.congress.gov/product/pdf/RL/RL33691.
[68] *See CAFOs*, SIERRA CLUB, https://www.sierraclub.org/grassroots-network/food-agriculture/cafos (last visited Dec. 18, 2023).

Agency now defines "Concentrated Animal Feeding Operation" as Animal Feeding Operations that confine at least a certain number of animals (by species) and have waste materials that come in contact with the water supply.[69] But, from an originalist interpretation, all current Animal Feeding Operations would meet the 1972 image of a concentrated animal feeding operation.

Regarding implementation, states, territories, and tribes may receive authorization to implement the National Pollutant Discharge Elimination System program in their jurisdiction; which forty-seven states and one territory currently do.[70] Florida is one of those authorized states.[71] To become an authorized implementer, a jurisdiction's program requirements must, at a minimum, be as stringent as the federal requirements.[72] Jurisdictions, however, may impose requirements that are broader or more stringent than federal requirements.[73]

Those permits allow facilities to discharge a specified amount of a pollutant into receiving waters, pursuant to enumerated conditions.[74] The permits may also authorize the processing, landfill, or "beneficial use" of sewage sludge.[75] A preeminent "beneficial use" of animal waste is spraying it over crops as a fertilizer.[76]

ii. Total Maximum Daily Loads

Animal Feeding Operations and smaller farms are generally regulated under the total maximum daily loads category of the Clean Water Act because they are categorized as nonpoint sources. They can also be regulated more strictly by their state's laws. "The term 'nonpoint source' is defined as any source of water pollution that does not meet the legal definition of 'point source.'"[77] Nonpoint source pollution "generally results from land runoff, precipitation, atmospheric deposition, drainage, and seepage . . . ."[78]

"States report that nonpoint source pollution is the leading remaining cause of water quality problems."[79] While nonpoint sources are notoriously challenging to regulate because it can be difficult to determine where pollutants originate

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[69] *See* 40 C.F.R. § 122.23(b)-(c) (2023).
[70] *See* 33 U.S.C. § 1342 (a)-(b).
[71] *See generally NPDES State Program Authority*, NAT'L POLLUTANT DISCHARGE ELIMINATION SYS., https://www.epa.gov/npdes/npdes-state-program-authority (demonstrating Florida as one of the states authorized to implement the National Pollutants Discharge Elimination Discharge programs) (last visited Dec. 18, 2023).
[72] *See* 33 U.S.C. § 1342 (n)(2).
[73] *See* § 1342(b).
[74] *See* § 1342(a).
[75] *See* 33 U.S.C. § 1345.
[76] *See Biosolids*, EPA, https://www.epa.gov/biosolids/basic-information-about-biosolids (last visited Dec. 18, 2023).
[77] *See Polluted Runoff: Nonpoint Source (NPS) Pollution*, EPA, https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution (last updated Dec. 22, 2022).
[78] *Id.*
[79] *Id.*

from, that is not so with animal agriculture; such operations are readily identifiable as a source of nutrient pollution.[80]

The total maximum daily load program is a two-step process. First, states are required to develop a list of impaired waters – those that do not meet water quality standards.[81] States are required to reevaluate their impaired waters list at least every two years.[82] Second, for impaired waters, states must develop total maximum daily loads and establish priority rankings.[83] Daily loads are the maximum amount of a pollutant (including nutrients) that a waterbody can receive and still meet water quality standards.[84]

To implement daily loads, the Florida Department of Environmental Protection establishes Basin Management Action Plans.[85] The Department identifies all known contributors of pollutants within a water basin, and then assigns load reductions.[86] Florida's Department of Agriculture and Consumer Services (FDACS) then develops Best Management Practices to achieve the established level of pollution reduction.[87]

Nonpoint source contributors within those designated basins must enroll in the Florida Department of Agriculture and Consumer Services' Best Management Practices program.[88] Those feeding operations must then either: (1) properly implement applicable Best Management Practices, or (2) conduct water quality monitoring prescribed by Florida's Department of Environmental Protection or their water management district to show that the operation is meeting state water quality standards.[89] There are different Best Management Practices based upon the species of livestock a feeding operation holds. For example, the Best Management Practices for poultry recommend covering waste piles

[80] *See generally Agricultural Operations*, Nat'l Ocean Serv., https://oceanservice.noaa.gov/education/tutorial_pollution/06operations.html (last visited Dec. 18, 2023) ("In agriculture, large tracts of land are typically plowed to grow crops. Plowing the land exposes and disturbs the soil, making it more vulnerable to erosion during rainstorms. This increases the runoff that carries fertilizers and pesticides away from the farm and into nearby waters.").
[81] *See* 33 U.S.C. § 1313(d)(1)(a)-(c).
[82] *See* 40 C.F.R. § 130.7(c).
[83] *See* § 130.7(b)(5).
[84] *See* § 130.7(c)(2).
[85] *See* FLA. STAT. § 403.067(7) (2022).
[86] *See id.*
[87] *See id.*; *see also Agricultural Best Management Practices*, FLA. DEP'T OF AGRIC. & CONSUMER SERV., https://
www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Best-Management-Practices (last visited Dec. 18, 2023).
[88] *See* FLA. STAT. § 403.067(7)(d)(3) (2022); *see also Agricultural Best Management Practices*, *supra* note 87.
[89] *See Agricultural Best Management Practices*, *supra* note 87.

with heavy plastic and not piling waste within 200 feet of surface water to prevent runoff water from being contaminated.[90] For dairy operations, recommendations include keeping the water level in lagoons as low as possible and not land-applying waste when rain is forecasted.[91]

iii. Florida's Water Pollution Laws

In recognition that water pollution is so detrimental to the quality of life and economics in Florida, the state implements supplemental control measures. This section details three of those control measures: (1) the Florida Air and Water Pollution Control Act, (2) the Florida Watershed Restoration Act, and (3) the Clean Water Ways Act. However valuable these measures appear to be, however, they share a common level of ineffectiveness at regulating agricultural nutrient pollution.

a. Florida Air and Water Pollution Control Act

Enacted in 1967, the Florida Air and Water Pollution Control Act declares that water pollution "constitutes a menace to public health and welfare," "is harmful to wildlife and fish and other aquatic life," and "impairs domestic, agricultural, industrial, recreational, and other beneficial uses of air and water."[92] It further declares that regulation of water pollution that is or may be detrimental to aquatic or plant life be increased to ensure "conservation of natural resources," "economic well-being," and "continuing growth of the economy and industrial development."[93]

To effectuate that policy, the Act furthers provides that the "[i]ndustry should be encouraged to install new machinery, equipment, and facilities as technology in environmental matters advances. . . ."[94]

b. Florida Watershed Restoration Act

This 1999 Act states that "while point and nonpoint sources of pollution have been managed through numerous programs, better coordination among these efforts and additional management measures may be needed in order to achieve the restoration of impaired water bodies."[95]

Further, it provides that the Florida Department of Environmental Protection and the Florida Department of Agriculture and Consumer Services may

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[90] *See Water Quality/Quantity Best Management Practices for Florida Poultry Operations*, FLA. DEP'T OF AGRIC. & CONSUMER SERV. (June 2016), https://ccmedia.fdacs.gov/content/download/71304/file/PoultryManual.pdf.

[91] *See Water Quality/Quantity Best Management Practices for Florida Dairy Operations*, FLA. DEP'T OF AGRIC. & CONSUMER SERV. (2015).

[92] FLA. STAT. § 403.021(1) (2022).

[93] § 403.021(6) (2022).

[94] § 403.021(7)(b) (2022).

[95] *See* FLA. STAT. § 403.067(1) (2022).

develop measures, including Best Management Practices, to achieve the level of pollution reduction established by the Florida Department of Environmental Protection.[96] Notably, implementation of those pollution reduction measures are mandatory for nonagricultural polluters and voluntary for agricultural polluters.[97] At least, however, when Florida Department of Agriculture and Consumer Services makes such rules it must consult with the Florida Department of Environmental Protection, the Florida Department of Health, water management districts, affected farmers, and environmental groups.[98]

Another aspect of this Act is providing a presumption of compliance with state water quality standards if operators enroll in and implement their applicable Best Management Practices program.[99] That presumption, which is meant to help protect agricultural operators, may actually hurt water quality efforts. That is because regardless of the impact of related pollution, Florida's Department of Environmental Protection is not authorized to institute proceedings against those polluters.[100]

c. Clean Waterways Act

In 2020, Florida unanimously enacted the Clean Waterways Act.[101] The law requires "a wide range of water-quality protection provisions aimed at minimizing the impact of known sources of nutrient pollution. . . ."[102] The law covers both permitted point source contributors and non-point source contributors. It requires agricultural landowners enrolled in the agricultural Best Management Practices programs to keep records on the total pounds of nitrogen and phosphorus from all sources that are applied to their operation.[103] Importantly, this provision does not actually require reduction of nutrient pollution. Instead, it simply requires documentation of that nutrient pollution.[104]

C. WHY IS THIS REGULATORY SYSTEM A PROBLEM FOR FLORIDA'S BUSINESSES?

While the Clean Water Act has accomplished much, its pollution limits are not strict enough. The Act does not prioritize nonpoint source pollution, despite that it is the leading remaining cause of water pollution. Especially considering

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[96] *See* § 403.067(7)(c)(2) (2022).
[97] *See* § 403.067(7)(c)(1)-(2) (2022).
[98] *See* § 403.067(7)(c)(2) (2022).
[99] *See* FLA. STAT. § 403.067(7)(c)(3) (2022).
[100] *Id.*
[101] *See Clean Waterways Act Stormwater Rulemaking Workshops*, FLA. DEP'T OF ENV'T PROT. (Mar. 24, 2023), https://floridadep.gov/water/engineering-hydrology-geology/content/clean-waterways-act-stormwater-rulemaking-workshops; *see also* Clean Waterways Act, Ch. 2020-150, 2020 Fla. Laws.
[102] *Clean Waterways Act Stormwater Rulemaking Workshops*, *supra* note 101.
[103] *See generally* Clean Waterways Act, Ch. 2020-150, 2020 Fla. Laws.
[104] *See* FLA. STAT. § 373.406(2) (2022).

the Clean Water Act's 50-year anniversary in 2022, advocates are calling upon governments to comprehensively and aggressively overhaul water pollution laws.[105]

Florida, for its part, fails to adequately augment federal standards, despite states' ability to do so. Where Florida could require feeding operations to internalize their own business costs and properly contain the nutrients they produce, the state instead allows them to spread nutrients into waterways. From there, an oversaturation of nutrients feeds red tides, suffocates marine life, and hurts other Floridian businesses.

The quality of life and economics in Florida are largely dependent on its beaches. While it can be difficult to calculate the full impact of fish kills, it is also difficult to overestimate them.[106] As far as their economic impact, it can be divided into four major categories: recreation and tourism, commercial fishing, public health, and monitoring and management efforts.[107]

Focusing on impacts to recreation and tourism, they start at the onset of fish kills. When day-of tourists leave the beach, the businesses they would have frequented suffer an immediate economic loss. That includes restaurants, water sport and beach rentals, grocery stores, and convenience stores. Secondary effects take hold when tourists cancel their trips, impacting more businesses like hotels. With predictions from water monitoring, impacts stretch even further. For example, the 2023 annual BeachFest in Indian Rocks Beach, Florida, was cancelled more than a month in advance because of a predicted red tide.[108]

These economic impacts can last for months at a time, and accordingly impact entire tourist seasons. Along Florida's Gulf Coast, the state saw one of its deadliest recorded red tide blooms that lasted from November 2017 to February 2019.[109] It killed 2,000 tons of marine life.[110] It was also the first red tide since 2007 to simultaneously impact Florida's southwest, northwest, and east

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[105] *See generally* Kevin DeGood, *A Call to Action on Combating Nonpoint Source and Stormwater Pollution*, CAP (Oct. 27, 2020), https://www.americanprogress.org/article/call-action-combating-nonpoint-source-stormwater-pollution/.

[106] *See generally* Sara E. Kuhar, et al., *Public Perceptions of Florida Red Tide Risks* (Jan. 4, 2010), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2801421/.

[107] *Id.*

[108] Steve Janoski, *Red Tide Hits Florida's Southwest Coast, Killing Fish, Leaving Residents Gasping*, NY POST (Mar. 12, 2023), https://nypost.com/2023/03/12/florida-red-tide-kills-fish-sickens-residents-and-cancels-events/.

[109] *See Governor Announces Appointments to the Red Tide Task Force*, FLA. DEP'T OF ENV'T PROT. (Aug. 2, 2019), https://www.flgov.com/2019/08/02/governor-ron-desantis-announces-appointments-to-the-red-tide-task-force/.

[110] *See* Madeline Halpert, *Red Tide is Back and Killing Fish on South-Western Florida Beaches*, BBC (Mar. 7, 2023), https://www.bbc.com/news/world-us-canada-64869979.

coasts.[111] Simultaneous outbreaks can have the added impact of pushing beach-goers away from the region instead of just to another nearby beach.

Already, most major fish kills have occurred since 2000.[112] Further, fish kills are likely to become exponentially worse because nutrient pollution will combine with climate change impacts that make algal growth optimal, such as increased water temperatures and changes in frequency and intensity of rainfall.[113] Without action, red tides and fish kills will continue to worsen.

D. ENCOURAGING A REGULATORY SYSTEM THAT PREVENTS FISH KILLS

Regulatory change is needed because fish kills are not just an environmental problem. They are a tourism problem. They are a real estate problem. They are a business problem. They are an economic problem. Reducing red tides and their fish kills will allow coastal economies and business to thrive.

Other scholars have proposed solutions such as removing agricultural exemptions from water pollution laws and removing farming subsidies for polluters.[114] As well, scientists and scholars have written prolifically regarding how to improve agricultural practices, like using anaerobic digesters, grazing animals in pasture, and planting trees in pastures.[115] Those are reasonable, responsible, and effective solutions. However, there has not been enough willpower in legislatures to implement them.

Considering that, my proposals attack the problem from a different angle—creating a system where citizens, members of government, and members of the business and tourism industries gain the knowledge and determination to act.

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[111] *See Governor Announces Appointments to the Red Tide Task Force*, FLGOV.COM (Aug. 2, 2019), https://www.flgov.com/2019/08/02/governor-ron-desantis-announces-appointments-to-the-red-tide-task-force/.

[112] *See Freshwater Harmful Algal Blooms: Causes, Challenges, and Policy Considerations*, CONG. RSCH. SERV. (July 8, 2020), https://crsreports.congress.gov/product/pdf/R/R44871.

[113] *See* H. W. Paerl & J. Huisman, *Climate Change: A Catalyst for Global Expansion of Harmful Cyanobacterial Blooms*, ENV'T MICROBIOLOGY REPS. (Feb. 2009), https://www.researchgate.net/publication/237843908_Climate_Change_A_Catalyst_for_Global_Expansion_of_Harmful_Cyanobacterial_Blooms.

[114] *See generally Subsidizing Waste, How Inefficient US Farm Policy Costs Taxpayers, Businesses, and Farmers Billions*, UNION OF CONCERNED SCIENTISTS (Aug. 4, 2016), https://www.ucsusa.org/resources/subsidizing-waste.

[115] *See* Inga Melchior & Jens Newig, *Governing Transitions towards Sustainable Agriculture—Taking Stock of an Emerging Field of Research*, 13(2) *SUSTAINABILITY* 528 (2021), https://www.mdpi.com/2071-1050/13/2/528. *See generally* Marcia S. DeLonge et al., *Investing in the Transition to Sustainable Agriculture*, 55 Part 1 Environmental Science & Policy 266 (Jan. 2016).

My proposals will aid them to become more familiar with the wide-ranging fallout of agricultural nutrient pollution. From there, they can call for regulatory change.

Before delving into my proposals, I would be remiss not to mention that by addressing this cause of fish kills, we can also address a multitude of other problems stemming from animal agriculture. Animal feeding operations contribute to *at least* 19.6% of global greenhouse gas emissions,[116] and are a leading driver of zoonotic disease, antibiotic resistance, deforestation, biodiversity loss, and health disparities.[117] In line with Ockham's Razor,[118] I propose that all types of pollution from animal feeding operations should be more strictly regulated.

i. Interagency Red Tide Task Force

An interagency task force is an advantageous tool because it allows all relevant agencies to determine the full scope of fallout from nutrient pollution. Florida's Red Tide Task Force was established in 1997,[119] became inactive and unfunded by 2002, and was reactivated in 2019.[120] The task force is a good start, but it does not meet the challenge it faces. First, it is only authorized to make recommendations to Florida's Fish and Wildlife Research Institute for research, detection, monitoring, prediction, mitigation, and control of harmful algal blooms.[121] It is not authorized to advise the legislature. Second, although membership is comprised of "[eleven] expert researchers and leading scientists,"[122] it does not include Florida's business and tourism organizations.

To be truly effective, the task force should include:

> Enterprise Florida, Inc. – the nonprofit public-private partnership that organizes Florida's economic development.[123] Enterprise Florida, Inc. would help determine the full impact of fish kills on Florida's businesses and strategic economic planning.

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[116] *See* Xiaoming Xu et al., *Global Greenhouse Gas Emissions from Animal-Based Foods are Twice Those of Plant-Based Foods*, NATURE FOOD (Aug. 14, 2021), https://www.fao.org/3/cb7033en/cb7033en.pdf.

[117] *See* Jake Young, *What Should Health Professions Students Know About Industrial Agriculture and Disease?*, AMA J. OF ETHICS (Apr. 2023), https://journalofethics.ama-assn.org/article/what-should-health-professions-students-know-about-industrial-agriculture-and-disease/2023-04.

[118] Chris Simms, *Occam's razor*, NEWSCIENTIST, https://www.newscientist.com/definition/occams-razor/ (last visited Dec. 18, 2023) (describing Ockham's Razor as the premise that the simplest explanation is usually the best one).

[119] *See* FLA. STAT. § 379.2271 (2022).

[120] *See Harmful Algal Bloom/Red Tide Task Force*, FLA. FISH & WILDLIFE COMM'N, https://myfwc.com/research/redtide/taskforce/ (last visited Dec. 18, 2023); *see also* Steve Newborn, *Red Task Force Gets Reactivated*, WUSF NPR (Aug. 2, 2019), https://www.wusf.org/environment/2019-08-02/red-tide-task-force-gets-reactivated (informing that Governor Ron DeSantis has reactivated the Red Tide Task Force after fifteen years of being unfunded).

[121] *See* § 379.2271.

[122] *See State Task Force Efforts*, PROTECTING FLA. TOGETHER, https://protectingfloridatogether.gov/state-action/red-tide-task-force (last visited Dec. 18, 2023).

[123] *See* ENTERPRISE FLA., https://www.flgov.com/enterprise-florida/ (last visited Dec. 18, 2023).

VISIT FLORIDA – the nonprofit that manages Florida's tourism marketing.[124] VISIT FLORIDA would help determine the full impact of fish kills on Florida's tourism industry.

ii. Media Campaign

Despite the known dangers of nutrient pollution from animal feeding operations, there are purposeful gaps and exemptions in pollution regulation. This proposal addresses that issue twofold by: (1) fostering knowledge of red tides' and fish kills' food source, and (2) empowering citizens to hold polluters accountable. A media campaign is ripe to effectuate those goals because it can cultivate informed citizens that call for change.

A good media campaign will:

- Create meaningful and engaging content, including facts and statistics;
- Create a quick facts sheet to distribute to media and citizens;
- Utilize a variety of platforms, such as social media, radio, and local news;
- Encourage organizations to educate their constituents; and
- Be interactive with audiences.

The Office of Water Policy and Ecosystems Restoration, within Florida's Department of Environmental Protection, is an ideal sponsor for this campaign. That Office works to ensure "high quality water for human use and natural systems" to sustain "the state's economy and quality of life."[125] Funding is readily available through the National Environmental Education Act's[126] Environmental Education Grant Program.[127] That program supports locally-focused environmental education projects that increase the public's environmental literacy and encourage behavior that will benefit the environment.[128]

iii. Environmental Stewardship Certification Program

Florida Statutes provide that Florida's Department of Agriculture and Consumer Services "may" establish the State's Environmental Stewardship Certification Program.[129] That program is designed to promote agricultural operations

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[124] *See* FLA. STAT. § 288.1226 (2022); *see also About VISIT FLORIDA,* VISIT FLA., https://www.visitflorida.com/about-us/(last visited Dec. 18, 2023).

[125] *See Office of Water Policy and Ecosystems Restoration*, FLA. DEP'T OF ENV'T PROT., https://floridadep.gov/water-policy (last visited Dec. 18, 2023).

[126] *See* Pub. L. 101-619.

[127] *See Frequent Questions about the Environmental Education Grants Program*, ENV'T PROT. AGENCY, https://www.epa.gov/education/frequent-questions-about-environmental-education-grants-program (last visited Dec. 18, 2023).

[128] *Id.*

[129] *See* FLA. STAT. § 570.921 (2022).

"that demonstrate exemplary resource management that is related to environmental stewardship."[130] The program is also meant to promote environmental awareness and responsible resource stewardship in agricultural communities.[131]

The program allows agricultural operations to receive certification for:

1. A voluntary agreement between an agency and the agricultural operation for environmental improvement or water-resource protection;
2. A conservation plan that meets or exceeds the requirements set by United States Department of Agriculture; or
3. Adoption of water pollution best management practices. [132]

For operations that are certified, the program further requires periodic continuing education in relevant environmental stewardship issues.[133] I recommend making this program mandatory for all farms. That can be efficiently effectuated by changing statutory language from "may" to "shall."[134] From there, nutrient pollution would be reduced by farming operations selecting and implementing certification for any one of the three options.

E. COUNTERARGUMENTS

i. More Regulation Means Higher Prices for Animal Products

At first glance, it may appear that increased pollution regulation would harm farmers and consumers. That argument goes – more regulatory burden means more business expenses, and since farmers are already struggling to make ends meet and Americans require food, farm operation needs to remain cheap. That argument fails because 99% of America's farmed animals come from factory farming operations.[135] Those industrial farm operations are swimming in profits. In 2022, one of America's largest producers, Tyson Foods, Inc., posted a gross profit of $6.6 billion.[136]

The argument in favor of cheap farm operation proceeds that increased business expenses pass on to consumers. But we should not assume that consumer costs will increase. Some economists have found that environmental regulations not only have a benign impact on businesses' competitiveness, but that they may be a net positive force on the economy as a whole.[137] As well, from

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[130] § 570.921(1)(b) (2022).
[131] *See* § 570.921(3)(b) (2022).
[132] § 570.921(2) (2022).
[133] *See* § 570.921(1)(d) (2022).
[134] *See* § 570.921 (2022).
[135] *See* Jacy Reese Anthis, *US Factory Farming Estimates*, SCI. INS. (Apr. 11, 2019), https://www.sentienceinstitute.org/us-factory-farming-estimates.
[136] *See Tyson Foods Reports Fourth Quarter and Fiscal 2022 Results*, TYSON FOODS (Nov. 14, 2023), https://www.tysonfoods.com/news/news-releases/2022/11/tyson-foods-reports-fourth-quarter-and-fiscal-2022-results.
[137] *See* Richard A. Clarke et al., *The Challenge of Going Green*, HARV. BUS. REV. (July–Aug. 1994),

an economic psychology perspective, if consumers expect businesses to wholly absorb rising costs, companies may well do so.[138] Last, it is vital to consider that consumers are already paying the higher price for animal products – because of nutrient pollution's externalities, consumers are just paying the rest of the bill at the tax collector's office instead of the grocery store.

ii. Regulating Farms Will Not Solve This Problem

Another critique of this approach is that reducing pollution from animal feeding operations will not end fish kills because there are other sources of nutrient pollution, such as landscaping fertilizer.[139] And while all pollution is problematic, implicating other sources does nothing to resolve the one identified. What is more, surplus sources of pollution make an exponentially larger impact, making reducing one source significantly impactful.[140]

IV. CONCLUSION

Florida's economy is largely dependent on the health of its beaches. Yet, animal feeding operations pollute Florida's waters. That pollution feeds red tides and fish kills, making beaches unpalatable. Worse still, farms' nutrient pollution is making red tides occur more frequently, stay onshore longer, and increase in geographic extent. And to the detriment of coastal businesses dependent on tourism, federal and state law allow animal feeding operations to pollute. To be sure, communities lose hundreds of millions in tourism revenue from single red tide blooms.

As it stands, water pollution laws allow animal feeding operations to cut costs at the expense of other businesses. Expanding Florida's Red Ride Task Force, educating citizens via a media campaign, and mandating operators' participation in the Environmental Stewardship Certification Program can combat Florida's ineffective nutrient pollution laws. All in all, Florida's coastal businesses depend on citizens and citizens and regulators holding animal feeding operations accountable for their nutrient pollution.

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https://hbr.org/1994/07/the-challenge-of-going-green.

[138] *See* Robert J. Dolan, *How Do You Know When the Price is Right?*, HARV. BUS. REV. (Sept.–Oct. 1995), https://hbr.org/1995/09/how-do-you-know-when-the-price-is-right (analyzing factors of the pricing process such as customer price sensitivity and emotional response to help identify optimal pricing for a product).

[139] *See* Todd Ruebold, *Study: Lawn Fertilizers and Pet Waste are the Major Sources of Nitrogen and Phosphorus Pollution in Urban Waters*, UNIV. OF MINN. INST. ON THE ENV'T (Apr. 3, 2017), https://environment.umn.edu/news/nitrogen-and-phosphorus-pollution-in-urban-watersheds/ (discussing a study pointing out that law fertilizers and pet waste were the dominant source of nutrient pollution in seven sub-watersheds of the Mississippi River).

[140] *See generally Accelerating Loss of Ocean Species Threatens Human Well-Being*, NAT'L SCI. FOUND., https://www.nsf.gov/news/news_summ.jsp?cntn_id=108149 ("The study reveals that every species lost causes a faster unraveling of the overall ecosystem. Conversely, every species recovered adds significantly to overall productivity and stability of the ecosystem and its ability to withstand stresses.").