MEMORANDUM:
NEPA Scoping Process Public Comment

Prepared by U.S. Congressman Brian Mast
Prepared for the U.S. Army Corps of Engineers
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I. AUTHORIZED PROJECT PURPOSES

In a post entitled "Why we release water," published on June 15, 2018, then Jacksonville District Commander Col. Jason Kirk acknowledged "that large amounts of freshwater into estuaries that are supposed to be brackish isn't good for the aquatic plant life or wildlife," but according to him that does not matter because "The LORS and the Corps' Congressional authorities call for our paramount consideration to be the reduction of flood risk."[1] This assertion is either misinformed or willfully ignorant. In fact, it is in direct contravention of Congressional intent. Congress has not placed any of the authorized project purposes as more important than any others.

LORS itself ignores important Congressionally-authorized project purposes. LORS states that "the Congressionally-authorized project purposes for Lake Okeechobee, the Okeechobee Waterway (OWW) and the Everglades Agricultural Area (EAA)…include flood control; navigation; water supply for agricultural irrigation, municipalities and industry, the Everglades National Park (ENP), regional groundwater control, and salinity control; enhancement of fish and wildlife; and recreation."[2] This list of authorized project purposes is insufficient and incomplete.

Notably absent from the list are the authorized project purposes of Water Quality—derived from P.L. 90-483 § 203, P.L. 92-500 and P.L. 95-217—and Preservation of Everglades National Park—derived from P.L. 90-843 § 203, P.L. 101-229[3]. LOSOM must take into account these additional authorized project purposes, and to the extent that any authorized project purpose is considered "paramount," these must be given at least equal weight.[4]

a. Water Quality

In a letter dated June 22, 2018, Colonel Jason A. Kirk stated that "while water quality is a consideration, addressing water quality is not a federally authorized project purpose and not a primary factor in determining how much water to release."[5] P.L. 90-483 § 203, however, dictates numerous authorized project purposes for the Central and Southern Florida Plan. These include consideration of "the quality of the waters of the area."[6] This definition encompasses whether the water is "generally good for recreational purposes such as swimming and fishing."[7] The definition also includes whether the "river and canal systems" are "generally polluted."[8] The report also includes how the "intrusion of brackish water" is "impeded by control structures

[1] Col. Jason Kirk, U.S. Army Corps of Engineers, *Why we release water* (June 15, 2018), https://www.saj.usace.army.mil/Media/News-Stories/Article/1552379/why-we-release-water/.
[2] U.S. Army Corps of Engineers, *Water Control Plan for Lake Okeechobee and Everglades Agricultural Area* (Mar 2008), https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/8423.
[3] *See* P.L. 90-483 § 203, P.L. 92-500, P.L. 95-217, P.L. 101-229.
[4] Colonel Jason A. Kirk, *Letter to Congressman Brian Mast* (July 5, 2018). *See* Appendix B.
[5] *Id.*
[6] P.L. 90-483 § 203 at 46.
[7] *Id.*
[8] *Id.*

or fresh-water flow."[9] Each of these categories necessitate that the Army Corps incorporate as a "paramount" consideration the water quality impacts of discharges into the St. Lucie and Caloosahatchee Rivers.

P.L. 92-500 and P.L. 95-217 dictate the Army Corps' requirements under the Clean Water Act.[10]

b. Preservation of Everglades National Park

P.L. 90-483 and P.L 101-229 both ensure that the preservation of Everglades National Park generally is an authorized project purpose.[11] This authorized project purpose includes taking "steps to restore the natural hydrological conditions within the park."[12] The discharges of massive quantities of water to the coasts, or the injection of water underground where it cannot be recovered, is antithetical to the Army Corps' authorized project purpose of preserving Everglades National Park and protecting the water supply of Everglades National Park.

II. PUBLIC HEALTH

NEPA requires the Army Corps to consider "the degree to which the proposed action affects public health or safety."[13] Although the Army Corps has consistently insisted that they have a duty to protect public health and safety only as it relates to flood risk management[14], NEPA supersedes the authorized project purposes and requires that public health for all people is considered before LOSOM can be finalized.[15] Moreover, the Army Corps is required to consider the human environmental impacts, including the human health risks associated with human interaction with those water bodies.[16]

a. Connection Between Discharges and Public Health Threats

The flow of toxic algae from Lake Okeechobee to the St. Lucie and Caloosahatchee Rivers during discharges is well established. For example, a report completed for the Florida legislature by the Water Institute at the University of Florida found that "freshwater inflows…have transported toxic microalgae into the St. Lucie estuary, with a substantial bloom of *Microcystic*

[9] *Id.*
[10] *See* P.L. 92-500, P.L 95-217.
[11] *See* P.L. 90-483, P.L. 101-229.
[12] P.L. 101-229 § 103.
[13] 40 C.F.R. § 1508.27.
[14] COL Andrew D. Kelly, Jr., U.S. Army Corps of Engineers, *Lake Okeechobee System Operation Manual (LOSOM) A Component of the Central & Southern Florida (C&SF) System Operating Plan Florida Congressional Delegation Briefing* (Jan 29, 2019). *See* Appendix C.
[15] *Id.*
[16] 40 C.F.R. § 1508.14.

aeruginosa being recorded in 2005."[17] Since then, excessive discharge events in 2013, 2016 and 2018—just to name a few—have resulted in extremely harmful algal bloom events.[18]

In 2018, the U.S. Geological Survey, in coordination with the U.S. Army Corps of Engineers, released a report that found that "as freshwater cyanobacteria are transported to brackish and marine waters, there will be a loss of membrane integrity which will lead to the release of cellular microsystin into the surrounding waterbody."[19] While numerous additional factors do contribute to the proliferation of harmful algal blooms, the causal connection between discharges and the blooms is scientifically indisputable—as evidenced by the U.S. Army Corps of Engineers own study.

b. Health Standards

The scope of the scientific understanding of public health risks related to cyanobacteria has likewise increased substantially since LORS was put into place. In fact, the words "algal" or "algae" appear only five times in LORS and the word "cyanobacteria" never appears.[20] In fact, the Final Supplemental Environmental Impact Statement published in November 2017 incorrectly states that "it is unlikely that discharges from Lake Okeechobee are a prerequisite for HAB formation."[21] The U.S. Army Corps of Engineers own scientific studies now disprove this point.[22] Moreover, when algae is discussed, LORS discusses only the possibility that algal blooms may develop and proposes that "short-term high rates of release from Lake Okeechobee are often effective at breaking up such algal blooms."[23] As we have seen repeatedly over the past decade, including during horrific outbreaks in 2016 and 2018, this is woefully insufficient. LOSOM must correct this injustice.

As you know, concentrations of toxins in blue-green algae use a measurement of parts per billion. According to the World Health Organization, water with more than one part per billion is unsafe to drink and water with more than 10 parts per billion is unsafe for recreational

[17] University of Florida Water Institute, *Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades* (Mar 2015), https://waterinstitute.ufl.edu/faculty/graham/wp-content/uploads/UF-Water-Institute-Final-Report-March-2015.pdf. *See* Appendix D.
[18] *See*, e.g., TCPalm, *Highly toxic blue-green algae at dam where Lake O waters enter St. Lucie River* (Aug 29, 2018), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2018/08/29/dep-highly-toxic-blue-green-algae-dam-leading-st-lucie-river/1131439002/. *See* Appendix E.
[19] U.S. Department of the Interior, *Understanding the Effect of Salinity Tolerance on Cyanobacteria Associated with a Harmful Algal Bloom in Lake Okeechobee, Florida* (2018), https://pubs.usgs.gov/sir/2018/5092/sir20185092.pdf. *See* Appendix F.
[20] LORS, *supra* note 2.
[21] U.S. Army Corps of Engineers, *Final Supplemental Environmental Impact Statement: Lake Okeechobee Regulation Schedule* (Nov 2007), https://www.saj.usace.army.mil/Portals/44/docs/h2omgmt/LORSdocs/ACOE_STATEMENT_APPENDICES_A-G.pdf.
[22] U.S. Department of the Interior, *supra* note 19.
[23] *Id* at 7-6.

contact.[24] After nearly two months of discharges, at the beginning of August 2018, algae in the St. Lucie River was ten times too toxic to touch based on this measurement.[25] By the end of the month, algae in the St. Lucie River had tested at nearly 50 times too toxic for recreational contact.[26]

In 2015, the United States Environmental Protection Agency (EPA) released the "Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water" pursuant to P.L. 114-45.[27] The report stated "one of the strongest drivers for changes that may be required to prevent future HABs, and/or mitigate those that occur, is the threat of serious adverse health effects in exposed populations."[28]

The report also found that "there are adequate health effects data to develop [Health Advisories] for microcystins."[29] The Health Advisory establishes limits for drinking water exposure and notes that infants, young children, pregnant women, nursing mothers, the elderly and immune-compromised individuals are at heightened risk.[30] The Health Advisory establishes a maximum safe level for drinking water levels of .3 parts per billion for bottle fed infants and young children of pre-school age.[31] For school-age children through adults, the standard is set at 1.6 parts per billion.[32] Many countries and states have also adopted the World Health Organization's standard of 1 part per billion.[33] These include Brazil, China, Czech Republic, Denmark, Finland, France, Germany, Italy, Japan, Korea, Netherland, Norway, New Zealand, Poland, South Africa, Spain, Ohio and Oregon.[34]

[24] World Health Organization, *Toxic cyanobacteria in water* (1999), https://www.who.int/water_sanitation_health/publications/toxicyanobact/en/. *See* Appendix G.
[25] TCPalm, *Blue-green algae bloom in St. Lucie River 10 times too toxic to touch, DEP tests show* (Aug 8, 2018), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2018/08/08/dep-st-lucie-river-algae-bloom-10-times-too-toxic-touch/864668002/. *See* Appendix E.
[26] TCPalm, *supra* note 17.
[27] United States Environmental Protection Agency, *Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water* (Nov 2015), https://www.epa.gov/sites/production/files/2015-11/documents/algal-risk-assessment-strategic-plan-2015.pdf. *See* Appendix H.
[28] *Id.*
[29] United States Environmental Protection Agency, *2015 Drinking Water Health Advisories for Two Cyanobacterial Toxins* (June 2015), https://www.epa.gov/sites/production/files/2017-06/documents/cyanotoxins-fact_sheet-2015.pdf. *See* Appendix H.
[30] United States Environmental Protection Agency, *Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins* (June 2015), https://www.epa.gov/sites/production/files/2017-06/documents/microcystins-report-2015.pdf. *See* Appendix H.
[31] *Id.*
[32] *Id.*
[33] *Id.*
[34] *Id.*

c. Additional Impacts

In 2016, the Centers for Disease Control launched an online portal to inform the public about new research related to the health impacts of harmful algal blooms.[35] The CDC website states that "Harmful algal blooms (HABs) are the rapid growth of algae that can cause harm to animals, people, or the local ecology….HABs can produce toxins that have caused a variety of illnesses in people and animals."[36]

The website summarizes scientific studies conducted between 2000 and 2008 as follows: "Harmful algal blooms (HABs) can produce toxins that cause illness in people, companion animals (dogs, cats), livestock (sheep, cattle), and wildlife (including birds and mammals). Exposures to the toxins can occur when people or animals have direct contact with contaminated water by: swimming, breathing in aerosols (tiny airborne droplets or mist that contain toxins) from recreational activities or wind-blown sea spray, [or] swallowing toxins by drinking contaminated water or eating contaminated fish or shellfish."[37]

According to the Centers for Disease Control, "Anyone who visits a contaminated water body during a HAB event can be exposed through direct contact with the contaminated water. Skin irritation and reactions in humans and animals can vary depending on the length of contact with the contaminated water and the type of HAB toxin present in the water."[38] Moreover, "people can swallow contaminated water while they are swimming or playing in the water. Active water sports (like water-skiing) pose a higher risk of accidental ingestion. Swimmers may swallow up to 16–200 mL of freshwater (the equivalent of 0.5 – 6.8 ounces of water) during one swim."[39]

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[35] Centers for Disease Control and Prevention, *CDC Launches updated Harmful Algal Blooms (HABs) website and One Health Harmful Algal Bloom System OHHABS as hot weather brings extensive HAB events* (Oct 24, 2016), https://www.cdc.gov/nceh/hsb/success_stories/harmful_algal_blooms.html. *See* Appendix I.

[36] Centers for Disease Control and Prevention, *Harmful Algal Bloom (HAB)-Associated Illness* (Accessed Feb 11, 2019), https://www.cdc.gov/habs/. *See* Appendix I.

[37] Centers for Disease Control and Prevention, *Harmful Algal Bloom (HAB)-Associated Illness: Illness & Symptoms* (Accessed Feb 11, 2019), https://www.cdc.gov/habs/illness.html. *See* Appendix I. *See also* Fleming L, Backer L, Rowan A. *The epidemiology of human illnesses associated with harmful algal blooms*. In: Massaro E, ed. *Handbook of Neurotoxicology*: Humana Press;2002:363-81; Kite-Powell HL, Fleming LE, Backer LC, Faustman EM, Hoagland P, Tsuchiya A, Younglove LR, Wilcox BA, Gast RJ. *Linking the oceans to public health: current efforts and future directions*. Environ Health. 2008;7(Suppl 2):S6; Van Dolah FM. *Marine algal toxins: origins, health effects, and their increased occurrence*. Environ Health Perspect. 2000;108(Suppl 1):133-41.

[38] Centers for Disease Control and Prevention, *Harmful Algal Bloom (HAB)-Associated Illness: Sources of Exposure & Risk Factors* (Accessed Feb 11, 2019), https://www.cdc.gov/habs/exposure-sources.html. *See* Appendix I. *See also* Koreivienė J, Anne O, Kasperovičienė J, Burškytė V. *Cyanotoxin management and human health risk mitigation in recreational waters*. Environ Monit Assess. 2014;186(7):4443-59; Van Dolah FM. *Marine algal toxins: origins, health effects, and their increased occurrence*. Environ health Perspect. 2000;108(Suppl 1):133.

[39] *Id*. *See also* Lopez CB, Jewett, EB, Dortch Q, Walton BT, Hudnell HK. *Scientific assessment of freshwater harmful algal blooms*. Interagency Working Group on Harmful Algal Blooms, Hypoxia, and Human Health of the Joint Subcommittee on Ocean Science and Technology. Washington, DC. 2008; Chorus I, Bartram J, eds. *Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring and management*. London, United Kingdom: World Health Organization; Routledge, London; 1999; Lopez CB, Dortch Q, Jewett EB, Garrison D. *Scientific assessment of marine harmful algal blooms. Interagency Working Group on Harmful Algal Blooms, Hypoxia, and Human Health of the Joint Subcommittee on Ocean Science and Technology*. Washington, DC. 2008; Anderson DM. *Approaches to monitoring, control and management of harmful algal blooms (HABs)*. Ocean and

Additionally, the Centers for Disease Control notes that "people can be exposed to a HAB or HAB toxins by inhaling (breathing in) tiny water droplets, mist, or sea spray from a contaminated body of water. This can occur even if a person does not go into the water … Individuals who have been on the beach or on a boat during a marine HAB event have reported breathing difficulties after inhaling air or water particles contaminated with HAB toxins. A study conducted during a Florida red tide found that marine HAB toxins could be transported in the air almost 4 miles inland from the water source."[40] and a 2018 Florida Gulf Coast University confirmed found that cyanotoxins can become aerosolized and breathed more than a mile away from water.[41] Moreover, a 2018 Florida Atlantic University study found that 100% of Martin County residents who were testing for cyanotoxins in their nasal passages tested positive for having breathed in the toxins.[42]

In addition to human impacts, according to the Centers for Disease Control, "animals can become sick when they drink contaminated water, groom themselves after swimming in contaminated water, or eat toxic algae or contaminated fish and shellfish in the water. In fact, animals are at a higher risk of ingesting contaminated water because they do not avoid water that

Coastal Manag. 2009;52(7):342-347; Koreivienė J, Anne O, Kasperovičienė J, Burškytė V. *Cyanotoxin management and human health risk mitigation in recreational waters*. Environ Monit Assess, 2014;186(7):4443-59.

[40] *Id*. *See also* Koreivienė J, Anne O, Kasperovičienė J, Burškytė V. *Cyanotoxin management and human health risk mitigation in recreational waters*. Environ Monit Assess. 2014;186(7):4443-59; Backer LC, McNeel SV, Barber T, Kirkpatrick B, Williams C, Irvin M, Zhou Y, Johnson TB, Nierenberg K, Aubel M. *Recreational exposure to microcystins during algal blooms in two California lakes*. Toxicon. 2010;55(5):909-21; Backer LC, Carmichael W, Kirkpatrick B, Williams C, Irvin M, Zhou Y, Johnson TB, Nierenberg K, Hill VR, Kieszak SM. *Recreational exposure to low concentrations of microcystins during an algal bloom in a small lake*. Mar Drugs. 2008;6(2):389-406; Backer LC, Kirkpatrick B, Fleming LE, Cheng YS, Pierce R, Bean JA, Clark R, Johnson D, Wanner A, Tamer R. *Occupational exposure to aerosolized brevetoxins during Florida red tide events: effects on a healthy worker population*. Environ Health Perspect. 2005;113(5):644-9; Kirkpatrick B, Fleming LE, Backer LC, Bean JA, Tamer R, Kirkpatrick G, Kane T, Wanner A, Dalpra D, Reich A. *Environmental exposures to Florida red tides: Effects on emergency room respiratory diagnoses admissions*. Harmful algae. 2006;5(5):526-33; Nierenberg K, Hollenbeck J, Fleming LE, Stephan W, Reich A, Backer LC, Currier R, Kirkpatrick B. *Frontiers in outreach and education: the Florida red tide experience*. Harmful Algae. 2011;10(4):374-80; Kirkpatrick B, Pierce R, Cheng YS, Henry MS, Blum P, Osborn S, Nierenberg K, Pederson BA, Fleming LE, Reich A. *Inland transport of aerosolized Florida red tide toxins*. Harmful Algae. 2010;9(2):186-89.

[41] News-Press, *Algae crisis: Airborne particles of toxic cyanobacteria can travel more than a mile inland, new FGCU study shows* (Mar 15, 2019), https://www.news-press.com/story/tech/science/environment/2019/03/15/new-health-questions-raised-fgcu-research-toxic-algae-dust/3176195002/. *See* Appendix E.

[42] TCPalm, *Health effects of breathing toxic algae in St. Lucie River is focus of Harbor Branch study* (Sep 14, 2018), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2018/09/14/people-along-st-lucie-river-breathing-toxin-harbor-branch-study/1270005002/. *See* Appendix E.

is discolored or smells bad."[43] In 2018, toxic algae in the St. Lucie River resulted in the death of one dog and at least five additional dogs becoming sick.[44]

Harmful algal blooms also pose a serious risk to contamination of water used for tap water.[45] The Environmental Protection Agency has suggested that the risk of harmful algal blooms contaminating drinking water is increasing.[46] Moreover, according to the Centers for Disease Control, "harmful cyanotoxins do not cause changes in tap water taste or odor."[47] As a result, "It is not possible to determine solely upon visual observation if a bloom is producing toxins, thus any bloom is potentially dangerous. When blooms occur, the risk of cyanotoxin contamination of the surface water increases, placing potential risk to drinking water sources."[48] In 2015, the Environmental Protection Agency warned that "Human exposure to cyanotoxins can result in a host of adverse health effects, including gastroenteritis, liver damage and kidney damage."[49]

The Centers for Disease Control has also warned that "people and animals can be exposed to HAB toxins by eating fish or shellfish from a freshwater body with a HAB. Freshwater fish can become contaminated with cyanotoxins when they eat toxin-producing cyanobacteria. … People and animals can be exposed to HAB toxins by eating seafood from contaminated marine (salt) water bodies. Shellfish can become contaminated when they filter and concentrate water with a HAB, and reef fish can become contaminated through the food chain."[50] In 2018, the Ocean Research and Conservation Association began tracking cyanotoxins in Martin County in the local food web.[51] Analysis of fish found that 27.8 percent of fillets and 69.8 percent of livers contained microcystin concentrations above ORCA's established detection limits.[52] As the

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[43] Centers for Disease Control and Prevention, *Harmful Algal Bloom (HAB)-Associated Illness: Illness & Symptoms* (Accessed Feb 11, 2019), https://www.cdc.gov/habs/illness.html. *See* Appendix I. *See also* Work TM, Barr B, Allison MB, Fritz L, Quilliam MA, Wright JLC. *Epidemiology of domoic acid poisoning in brown pelicans (Pelecanus occidentalis) and Brandt's cormorants (Phalacrocorax penicillatus) in California*. J Zoo Wildl Med. 1993;24(1):54-62; Beltrán AS, Palafox-Uribe M, Grajales-Montiel J, Cruz-Villacorta A, Ochoa J. *Sea bird mortality at Cabo San Lucas, Mexico: evidence that toxic diatom blooms are spreading*. Toxicon. 1997;35(3):447-53; Landsberg J, Flewelling L, Naar J. *Karenia brevis red tides, brevetoxins in the food web, and impacts on natural resources: Decadal advancements*. Harmful Algae. 2009;8(4):598-607; Bossart GD, Baden DG, Ewing RY, Roberts B, Wright SD. *Brevetoxicosis in manatees (Trichechus manatus latirostris) from the 1996 epizootic: gross, histologic, and immunohistochemical features*. Toxicol Path. 1998;26(2):276-82.

[44] TCPalm, *Toxic algae in St. Lucie River may have killed 1 dog, sickened 5 others, Stuart vet says* (Sep 10, 2018), https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2018/09/10/toxic-algae-dog-illnesses/1254048002/. *See* Appendix E.

[45] Centers for Disease Control and Prevention, *Harmful Algal Bloom (HAB)-Associated Illness: Sources of Exposure & Risk Factors* (Accessed Feb 11, 2019), https://www.cdc.gov/habs/exposure-sources.html. *See* Appendix I.

[46] Environmental Protection Agency, *Monitoring Unregulated Drinking Water Contaminants* (Accessed Feb 11, 2019), https://www.epa.gov/dwucmr/first-unregulated-contaminant-monitoring-rule#ucmr.

[47] Centers for Disease Control and Prevention, *supra* note 32..

[48] Environmental Protection Agency, *Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water* (June 2015), https://www.epa.gov/sites/production/files/2017-06/documents/cyanotoxin-management-drinking-water.pdf. *See* Appendix H.

[49] *Id.*

[50] Centers for Disease Control and Prevention, *supra* note 32.

[51] Ocean Research & Conservation Association, Inc., *Tracking Cyanotoxins in the Aquatic Food Web in Martin County* (2019). *See* Appendix J.

[52] *Id.*

preliminary publication of the report concludes, "These studies show that fishers are being exposed to cyanotoxins through fish consumption…ORCA's data should be used to support the need to improve water quality in Martin County."[53]

In conclusion, scientists and health professionals have found that toxic algae can cause nausea, vomiting, liver disease and even death.[54] Scientists have also linked at least one other toxin in the algae to neurological diseases such as ALS and Alzheimer's.[55] Unlike in 2008, we now know there is a strong causal link between these algae outbreaks and life-threatening public health consequences. We also know there is a strong causal link between discharges from Lake Okeechobee and the occurrences of algae outbreaks. Therefore, any regulation schedule that does not place a premium on the prevention of these discharges would be in direct violation of NEPA's requirement to consider "the degree to which the proposed action affects public health or safety."[56]

III. WATER QUALITY

LORS 2008 has caused substantial damage to the environment and water quality in Florida. The design has forced water where it is not wanted (and extremely harmful) and starved the areas that do want the water. For example, a 2017 Florida International University study showed that during the dry season, Florida Bay receives less than 5 percent of the historical freshwater flow it needs to avoid seagrass-killing hypersalinity.[57] Likewise, during the wet season, the bay receives less than 33 percent of its historical freshwater flow.[58] Meanwhile, the St. Lucie Estuary, which historically received no freshwater flows, is flooded with billions (or hundreds of billions) of gallons of polluted fresh water each year.[59]

[53] *Id.*
[54] Zhang et. al, Environmental Health, *Cyanobacteria blooms and non-alcoholic liver disease: evidence from a county level ecological study in the United States* (2015), https://ehjournal.biomedcentral.com/track/pdf/10.1186/s12940-015-0026-7. *See* Appendix K.
[55] Paul Alan Cox, David A. Davis, Deborah C. Mash, James S. Metcalf, Sandra Anne Bannack, *Dietary exposure to an environmental toxin triggers neurofibrillary tangles and amyloid deposits in the brain*. The Royal Society Publishing. (Jan 27, 2016), https://royalsocietypublishing.org/doi/full/10.1098/rspb.2015.2397. *See* Appendix L.
[56] 40 C.F.R. § 1508.27.
[57] Jennifer S. Rehage, Florida International University, *Florida Bay: updated, effects & recovery from Hurricane Irma* (2017). *See* Appendix Z.
[58] *Id.*
[59] Data provided by the U.S. Army Corps of Engineers.

In addition to supporting human populations, the St. Lucie River and Estuary is one of the most biologically-diverse estuaries in the nation, described as "rich in habitats and species, with the greatest species diversity of any estuary in North America."[60]

The area also includes areas identified as "Outstanding Florida Waters," such as the Hobe Sound National Wildlife Refuge, the St. Lucie Inlet State Preserve, the Indian River State Aquatic Preserve and the Jensen Beach State Aquatic Preserve.[61] Regarding these bodies, Florida law states that "it shall be the Department policy to afford the highest protection to Outstanding Florida Waters and Outstanding National Resource Waters. No degradation of water quality…is to be permitted."[62]

The Indian River Lagoon estuary system is also one of only 28 estuaries designated as an estuary of national significance.[63] As a result of this designation, the U.S. Army Corps of Engineers must carefully evaluate its obligations under NEPA to evaluate adverse impacts on significant scientific resources and critical habitat.

Unfortunately, the estuary is also one of the most ecologically-stressed river and estuarine systems in the country as a result of decades of mismanagement of our ecosystem.

a. Sources of Pollution

In 1913, the State of Florida decided to construct a canal between Lake Okeechobee and the St. Lucie estuary to divert water from the lake and to support development south of the lake.[64] The first discharge of water into the estuary reportedly occurred in 1923.[65] Prior to that time, there was no natural connection between the lake and the St. Lucie estuary.[66] By 1930, the environmental impacts of this poor decision began to be realized and the Martin County Commissioners requested termination of the discharges.[67] For nearly the last century, our regions environmental health has been sacrificed by Florida and federal agencies in order to provide flood protection and irrigation benefits to communities south of Lake Okeechobee.[68]

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[60] *Patti Sime* (South Florida Water Management District), WETLANDS, *St. Lucie Estuary and Indian River Lagoon Conceptual Ecological Model* (Dec 2005), https://link.springer.com/article/10.1672/0277-5212(2005)025[0898:SLEAIR]2.0.CO;2. *See* Appendix M.
[61] Dr. Gary Goforth, *Suggestions to Reduce the Destructive Discharges to the St. Lucie River and Estuary* (Feb 7, 2014). *See* Appendix N.
[62] Florida Administrative Code Chapter 62.302-7090.
[63] United States Environmental Protection Agency, *National Estuary Program* (accessed Apr 16, 2019), https://www.epa.gov/nep/local-estuary-programs#tab-1.
[64] Dr. Gary Goforth, *Water Quality Assessment of the St. Lucie River Watershed – Water Year 2018 – DRAFT* (2019), http://www.garygoforth.net/DRAFT%20-%20Water%20Quality%20Assessment%20of%20the%20SLRW%20-%20Water%20Year%202018.pdf. *See* Appendix O.
[65] *Id.*
[66] *Id.*
[67] *Id.*
[68] *Id.*

In 2016, for example, more than 200 billion gallons of polluted Lake Okeechobee water—containing nutrients, sediment, toxic blue-green algae and low salinity water—was diverted from its natural flow and discharged east.[69] In 2017, more than 190 billion gallons of polluted water were discharged to the east.[70] A similar pattern of discharges and environmental destruction has also occurred on Florida's west coast in the Caloosahatchee estuary, which has received even higher volumes of flow.[71]

Over the course of the last water year (May 2017 – April 2018), the largest single source of phosphorus, nitrogen and sediment pollution to the St. Lucie River and Estuary was Lake Okeechobee discharges.[72] Total phosphorus concentrations in Lake Okeechobee discharges to the St. Lucie River and Estuary are more than 5 times the lake's Total Maximum Daily Load in-lake target concentration of 40 parts per billion.[73]

By land use, Lake Okeechobee discharges in water year 2018 accounted for 42 percent of the nitrogen load, 28 percent of the phosphorus load, 39 percent of the surface water flow and 90 percent of the total suspended solid load to the St. Lucie River and Estuary.[74] In the time period where the toxic algal blooms actually occurred in 2018, the numbers are even more jarring. Lake Okeechobee discharges during this time period accounted for more than half of the water entering the estuary.[75] From June 1, 2018 to October 5, 2018 - during which there were more than 100 reports of algal blooms in St. Lucie and Martin County and discharges were occurring[76] - Lake Okeechobee discharges accounted for 54 percent of the water, local basin agricultural runoff accounted for 35 percent and local communities (including runoff containing pollutants from septic tanks and fertilizer) accounted for just 8 percent.[77]

b. Misinformation Surrounding Septic Tanks

Nonetheless, during 2016, several special interest affiliated groups and people misleadingly claimed that the primary source of nutrient loads to the St. Lucie River and Estuary was the "200,000 septic tanks" that line Martin County waterways.[78] The Florida Department of Health, however, notes that there are less than 1/10 that number of septic tanks in Martin County.[79] Additionally, a former South Florida Water Management District Board Member falsely claimed that 80 percent of the nutrient loading to the St. Lucie River and Estuary was due to local septic tanks.[80]

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[69] Data provided by the U.S. Army Corps of Engineers.
[70] *Id.*
[71] *Id.*
[72] Goforth, *supra* note 59.
[73] *Id.*
[74] *Id.*
[75] *Id.*
[76] Florida Department of Environmental Protection, *Algal Bloom Sampling Results* (accessed Apr 16, 2019), https://floridadep.gov/dear/algal-bloom/content/algal-bloom-sampling-results. *See* Appendix P.
[77] Goforth, *supra* note 59.
[78] *Id.*
[79] *Id.*
[80] *Id.*

The truth is, though, that unlike discharges from Lake Okeechobee, septic tanks contribute no toxic algae, no sediment and no pesticides to our waterways.[81] Septic tanks contribute negligible amounts of water and phosphorous.[82] From 1980 to 2016, septic tanks contributed approximately 6 percent of the total estimated nitrogen load to the estuary.[83] By comparison, Lake Okeechobee discharges contributed 29 percent of the total load and runoff from local basin agricultural land contributed approximately 56 percent.[84] In years where there are high levels of discharges, the numbers are even more stark. During 2016, septic tanks represented approximately 4 percent of the total nitrogen load, Lake Okeechobee discharges accounted for 48 percent and runoff from local basin agricultural land was 41 percent.[85]

Moreover, Martin County and the City of Stuart have significantly reduced nutrient loading from septic systems over the last two decades.[86] For example, they have undertaken the conversion of more than 1,700 septic tanks to centralized sewers, which removed an estimated 15,400 pounds per year of nitrogen and more than 25 stormwater projects that have removed an estimated 30,000 pounds per year of nitrogen.[87] As a result, Martin County has exceeded the nitrogen load reductions required under the State's Basin Management Action Plan, and nonetheless, is still planning additional septic to sewer conversion projects.[88]

This information is included not to minimize the importance of addressing local sources of pollution but to highlight the fact that continuing to address septic to sewer conversions without also addressing the much more harmful impacts of Lake Okeechobee discharges will make only a small dent in the larger problem.

c. Impacts of Freshwater Infusion and Pollution

Habitats and species diversity in the Indian River Lagoon system are affected greatly by this decline in water quality. A study conducted in 2005 by staff at the South Florida Water Management District concluded that "the health of the system is being affected by water management and land-use development….The major anthropogenic changes in both the St. Lucie Estuary and the C-25 watersheds are significant alternations in the timing…, distribution, quality, and volume of fresh water entering the estuary, lagoon, and ocean….In turn, [these stressors] alters estuary salinity and increases turbidity and color."[89]

The study further identified six affected ecological attributes summarized below:

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[81] Dr. Gary Goforth, *Septic Tank Contributions to Pollutant Loading to the St. Lucie Estuary* (Feb 4, 2017). *See* Appendix Q.
[82] *Id.*
[83] *Id.*
[84] *Id.*
[85] *Id.*
[86] Goforth, *supra* note 59.
[87] *Id.*
[88] *Id.*
[89] Sime, *supra* note 55.

1. **Submerged Aquatic Vegetation (SAV):** "Changes in normal salinity ranges can adversely affect SAV" and "The input of increased levels of nutrients and dissolved organic matter effect SAV abundance and health" and "Large deposits of much that have replaced normal substrate in the estuary and portions of the Indian River Lagoon have contributed to the decrease in extent of SAV beds."[90]
2. **Oyster Communities:** "Oysters and other bivalves, such as mussels and clams, found in the St. Lucie Estuary and Indian River Lagoon are sensitive to salinity, loss of suitable hard bottom substrate, and high levels of total suspended solids in the water column."[91]
3. **Estuarine Fish Communities/Sport and Commercial Fisheries:** "Species richness in many of the fish communities of the estuary and lagoon has decreased since the 1970s when baseline data were collected. In addition to the general decrease in species richness, specific fish communities seem to be affected by salinity and habitat changes." and "Large freshwater releases from the St. Lucie Canal…produced significant incidences of fish disease and mortality, promoted toxic dinoflagellate blooms, and reduced overall biodiversity of estuarine and freshwater fish communities within the Indian River Lagoon."[92]
4. **Estuarine Benthic Communities:** "Benthic macroinvertebrate communities in the St. Lucie Estuary and Indian River Lagoon are sensitive to bottom type, water quality, and salinity fluctuations. A decrease in diversity of benthic organisms and increase in the numbers of pollution-tolerant micrometeorites…can indicated deteriorating water quality in the estuary and lagoon."[93]
5. **Shoreline Habitat:** "Mangrove wetlands and the emergent bank vegetation of tributaries of the St. Lucie Estuary and Indian River Lagoon support fish and macroinvertebrate communities…these once ubiquitous shoreline habitats have decreased…A significant portion of the floodplain in the North Fork of the St. Lucie River is completely or partially cut off from the river's main branch because of dredging conducting during the 1920s to 1940s….resulting in the loss of natural filtration of water-borne nutrients originating in the watershed."[94]
6. **Nearshore Reef:** "The nearshore reef has been adversely affected by high level freshwater discharges and the resulting silt and salinity plumes that are found primarily in the south of the St. Lucie and Ft. Pierce Inlets."[95]

The report stated in conclusion, "altered and unstable estuarine salinity has had the most significant effect on the estuary…Accompanying the regulatory water releases is the transport of massive volumes of organic and inorganic sediments, which contribute to deposits of much in the estuaries. The large accumulations of much covering the bottom of the estuary dramatically

[90] *Id.*
[91] *Id.*
[92] *Id.*
[93] *Id.*
[94] *Id.*
[95] *Id.*

decrease the quality and quantity of suitable habitat…High volume releases create an oceanic plume of colored water and suspended solids extending to the nearshore reef in the Atlantic Ocean, reducing light penetration and exacerbating salinity….The recurring high-flow conditions in the St. Lucie Estuary have significantly reduced the number of oysters, and the frequency at which these high flows occur has impeded recovery."[96]

In conclusion, while the ecology on Lake Okeechobee remains critically important, no study of the ecological or water quality impacts of the Lake Okeechobee System Operating Manual is complete without further analysis of the impacts of discharges on the estuaries. Moreover, NEPA requires your consideration of these effects on the estuaries.[97]

IV. ADDITIONAL ENVIRONMENTAL CONCERNS

The management of Lake Okeechobee is a balance between numerous interests with a complex system of often unpredictable variables, but scientific development over the last decade since LORS 2008 was written can help us better predict some of these variables.

For example, the Centers for Disease Control and Prevention states that "Climate change might increase the occurrence, severity, and impact of HABs in fresh, marine, and brackish waters. For example, warming temperatures in Lake Erie have resulted in more extensive blooms of cyanobacteria…that last into the early winter months. In the past several years, HABS have been observed with increasing frequency and in more locations in the United States."[98]

In addition to the impact on harmful algal blooms, changing weather patterns as a result of climate change and other factors also impact the temperature and amount of rain received in Florida, which is especially vulnerable to these shifting climate trends.[99] Scientists recognize that climate change is a major threat to ecosystems globally, especially wetlands such as the Everglades.[100] Warmer climates, along with changes in precipitation patterns and increases in carbon dioxide, affect hydrologic conditions and biogeochemistry.[101] In Florida specifically, sea-level has been rising at a faster rate than the also accelerating global average, and recent trends in Florida suggest further acceleration in this rate moving forward.[102]

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[96] *Id.*
[97] 40 C.F.R. § 1508
[98] Centers for Disease Control and Prevention, *Harmful Algal Blooms & the Environment* (accessed Apr 16, 2019), https://www.cdc.gov/habs/environment.html. *See* Appendix I.
[99] National Academies of Sciences, Engineering and Medicine, Progress Toward Restoring the Everglades: The Fifth Beinnial Review 131 (2014), https://www.nap.edu/catalog/18809/progress-toward-restoring-the-everglades-the-fifth-biennial-review-2014. *See* Appendix R.
[100] *Id.*
[101] *Id.*
[102] *Id.*

As a result of these trends, the National Academies of Sciences has recommended an Everglades-wide analysis that considers how the ecosystem will change as a result of climate change and how these changes will influence restoration goals.[103] In the meantime, they have recommended planning that—among other factors—utilizes climate change projections to inform decisions and makes operational decisions with maximum future flexibility in mind.[104]

Finally, since LORS 2008 was written, scientists have determined that the system was even wetter than originally projected.[105] LORS 2008 also overestimated the frequency of drought and underestimated the frequency of extreme high stage events, leading to discharges in 9 of the last 11 years while drought levels occurred in only one year.[106] A more accurate, scientifically-driven and flexible overall system that better takes into account rainfall and changing weather patterns could realize actual shared adversity instead of forcing nearly all of the adversity on the communities around the St. Lucie Estuary and Caloosahatchee Estuary.

V. RECREATIONAL ACTIVITIES AND ECONOMIC IMPACTS

In 2016 the East Coast Florida Regional Planning Council and the Treasure Coast Regional Planning Council produced a report on the economic valuation of the Indian River Lagoon.[107] The report concluded that the total annual economic output or value received from the Indian River Lagoon in 2014 was approximately $7.6 billion.[108] This figure also does not include the estimated $934 million in annualized real estate value added for property located on or near the Indian River Lagoon, nor does it include the economic impacts on other regions impacted by the management of Lake Okeechobee, such as the impacts on tourism and recreation on the west coast of Florida.[109]

Moreover, the industry groups in the area that rely on the Indian River Lagoon collectively support more than 70,000 jobs annually with wages in excess of $1.2 billion and the tourism industry attracts more than 7 million visitors annually.[110] Each additional visitor spends approximately $162 per day, creating a new job for every 85 visitors to the area.[111]

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[103] *Id.*
[104] *Id.* at 166.
[105] *Id.*
[106] Data provided by the U.S. Army Corps of Engineers.
[107] East Coast Florida Regional Planning Council and Treasure Coast Regional Planning Council, *Indian River Lagoon Economic Valuation Update* (Aug 26, 2016), http://tcrpc.org/special_projects/IRL_Econ_Valu/FinalReportIRL08_26_2016.pdf. *See* Appendix S.
[108] *Id.*
[109] *Id.*
[110] *Id.*
[111] *Id.*

The report, however, identified that the "Indian River Lagoon-Dependent" industry was in decline, and this decline is directly linked to the poor management of our water resources.[112] For example:

- The overall economic impact of commercially harvested clams, oysters, crabs and shrimp in the area has declined by nearly 80 percent over the last two decades, adjusted for inflation.[113]
- Pounds of shellfish harvested during the same period also declined from about 7.1 million pounds to 2 million pounds.[114]
- Over the same time period, the overall value of commercial fin fish harvest has declined by 37 percent after being adjusted for inflation.[115]
- There has also been a decline in boat registrations for the Indian River Lagoon region over the last decade. While the population has increased by 12 percent, boat registration has decreased by 11 percent since 2005.[116]

These are just a couple economic indicators. As the report concludes, "The IRL and nearshore coastal resources are significant contributors to the region's strong economy and extraordinary quality of life. Sustaining the IRL is important to the region's economic recovery…and sustainable growth."[117]

This report is backed up by additional studies with similar conclusions. For example, a 2015 study conducted by the Florida Realtors Association concluded that "the ongoing problem of polluted water in the Caloosahatchee and St. Lucie Rivers and estuaries has indeed resulted in a negative impact on home values….Many Realtors, for instance, have reported lost sales due to poor water quality related to discharges from Lake Okeechobee…The greater direct damage to home values in these markets is the continuing recurrence of these types of events, and the increasing frequency with which they are occurring. This effect is longer lasting and does not go away when the algal blooms and murky waters clear up after each incident."[118]

As the 2016 economic study stated, however, "the health and sustainability of the IRL will be a key determinant in the future of the region's economy, public health and other natural, cultural, and societal values that are collectively worth far more than what has been quantified in this report."[119] For example, recreational and commercial fishermen have felt both economic and non-economic impacts:

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[112] *Id.*
[113] *Id.*
[114] *Id.*
[115] *Id.*
[116] *Id.*
[117] *Id.*
[118] Florida Realtors Association, *The Impact of Water Quality on Florida's Home Values* (Mar 2015), https://www.floridarealtors.org/ResearchAndStatistics/Other-Research-Reports/upload/FR_WaterQuality_Final_Mar2015.pdf. *See* Appendix T.
[119] East Coast Florida Regional Planning Council, *supra* note 102.

- The American Sportfishing Association estimates that ever year in the 18th Congressional District of Florida alone 106,885 anglers spend more than $130 million on fishing related purchases, which supports $206.6 million in economic output and 1,642 jobs.[120]
- The 2005 South Florida Water Management District Report found that "lowered salinities can result in atypical freshwater conditions that are conducive to the persistence of fish pathogens, such as fungi, that have been implicated as a causal factor for lesioned fish within the St. Lucie Estuary."[121]
- The 2018 ORCA study found that "subsistence fishers eat 3 to 4 times more fish than the average US citizen and depend on fishing for up to seven meals each week. Most fish caught at the Port Mayaca locks had detectable microcystin….These fishers also face additional cyanotoxin exposure while they fish through skin contact with contaminated water and inhalation of aerosolized microsystin."[122]

This data is provided not as a comprehensive look at the recreational and economic impacts of water management decisions, but rather to exemplify the impacts on recreation and the economy for the communities supported by the St. Lucie and Caloosahatchee estuaries. As the U.S. Army Corps of Engineers evaluates the authorized project purposes and NEPA requirements, the scope must include these impacts on the estuaries and surrounding communities, in addition to the impacts of recreation on Lake Okeechobee itself.

VI. ENHANCMENT OF FISH AND WILDLIFE

Both the authorized project purposes and NEPA require that the impacts on fish and wildlife be taken into account, not only on Lake Okeechobee or in the Everglades, but also in the estuaries and other "reasonably foreseeable" future effects.[123] These impacts include those discussed above, as well as impacts on endangered and threaten species and other wildlife.

Notably, the St. Lucie Estuary and Indian River Lagoon are together home to more than 50 endangered or threatened species.[124] The St. Lucie River, moreover, is home to more than 500 fish species.[125] The North Fork of the St. Lucie River is a state aquatic preserve and home to more than 650 native species, including 33 species of special concern and an additional 20 rare species.[126] The preserve also contains rookeries for the endangered wood stork.[127] The Hobe

[120] American Sportfishing Association, *Economic Contributions of Recreational Fishing by Congressional Districts* (accessed Apr 16, 2019), https://asafishing.org/economic-contributions-of-recreational-fishing/.
[121] Sime, *supra* note 55.
[122] Ocean Research & Conservation Association, Inc., *supra* note 49.
[123] 40 C.F.R. § 1508
[124] South Florida Water Management District, *North Fork of the St. Lucie River Water Restoration* (Apr 2015), https://www.sfwmd.gov/sites/default/files/documents/jtf_slr_res.pdf. *See* Appendix U.
[125] *Id.*
[126] *Id.*
[127] *Id.*

Sound National Wildlife Refuge is home to nearly 40 species listed as either threatened, endangered, or of special concern.[128] The Caloosahatchee estuary is likewise home to species protected by the Endangered Species Act.[129] These species collectively are routinely threatened by the Army Corps' actions and far more emphasis must be placed on this area than was done in LORS 2008.

Additionally, the U.S. Army Corps of Engineers must take into account effects that are "reasonably foreseeable" as part of its NEPA requirements.[130] For example, statistics from the Florida Fish and Wildlife Commission say that red tide and blue-green algae are to blame for a substantial rise in manatee deaths in 2018.[131] Moreover, numerous scientific studies have connected the cyanobacterial neurotoxin BMAA to damaging impacts on sharks and dolphins.[132] Most recently, a 2019 study found that toxins produced by blue-green algae were found in dead dolphins that showed signs similar to an Alzheimer's-like brain disease.[133] Not only is this concerning for the similar impacts that humans could experience, but it necessitates review by the U.S. Army Corps of Engineers as part of the NEPA process.

VII. RECOMMENDATIONS

The U.S. Army Corps of Engineers must institute increased flexibility to manage the lake at a lower level under the new Lake Okeechobee System Operating Manual (LOSOM) that balances human health needs; the ecological needs of the St. Lucie Estuary, the Caloosahatchee Estuary and Lake Okeechobee; the economic and recreational impacts of the estuary regions and on Lake Okeechobee; reducing the risk of Dike failure; navigation on the Lake; water flows south to the Everglades and Florida Bay; and public-use water supply such as for municipalities and drinking water.

This increased flexibility must ensure that the ecological, human health and economic needs of the estuary regions are finally considered as part of the equation. Moreover, periodic lower lake levels would be ecologically beneficial to the estuaries and often to the lake as well. When these interests align, the system should not be forced to be operated in a way that restricts commonsense water management decisions.

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[128] U.S. Fish and Wildlife Service, *Nathaniel P. Reed Hobe Sound National Wildlife Refuge: About the Refuge* (accessed Apr 16, 2019), https://www.fws.gov/refuge/Hobe_Sound/about_the_refuge.html.
[129] U.S. Fish and Wildlife Service, *Caloosahatchee National Wildlife Refuge Fact Sheet* (accessed Apr 16, 2019), https://www.fws.gov/southeast/pdf/fact-sheet/caloosahatchee-national-wildlife-refuge.pdf.
[130] 40 C.F.R. § 1508
[131] Florida Fish and Wildlife Conservation Commission, *2018 Preliminary Red Tide Manatee Mortalities* (Mar 7, 2019), https://myfwc.com/media/18471/2018preliminaryredtide.pdf. *See* Appendix V.
[132] *See*, e.g., Mondo et. al, Food and Chemical Toxicology, *Environmental Neurotoxins* b-N-methylamino-L-alanine (BMAA) and mercury in shark cartilage dietary supplements (Feb 25, 2014); Hammerschlag et. al, Toxins, Cyanobacterial Neurotoxin BMAA and Mercury in Sharks (Apr 28, 2016); Davis et. al, *Cyanobacterial neurotoxin BMAA and brain pathology in stranded dolphins* (Mar 20, 2019). *See* Appendix W.
[133] Davis et. al, *Cyanobacterial neurotoxin BMAA and brain pathology in stranded dolphins* (Mar 20, 2019). *See* Appendix W.

Below are several recommendations to accomplish this goal:

a. LOSOM should include maximum flows south of the lake:

1. Although available STA treatment acreage has increased dramatically—more than 15-fold since 1995[134]—the volume of lake releases sent south has not kept pace. LORS 2008 recommended a dramatic decrease in the amount of regulatory releases sent south to the STAs. LORS 2008 assumed a limit on Lake Okeechobee releases to the STAs of 60,000 acre-feet per year, which results in substantial underutilization of these structures.[135] Instead, LOSOM should set aggressive minimum targets for releases to the STAs/WCAs before any regulatory releases are sent to the estuaries (excluding the ecologically beneficial flows to the Caloosahatchee).[136]
2. Moreover, as a publicly-accountable agency, South Florida Water Management District needs to operate with the transparency necessary to demonstrate that they are utilizing the maximum capacity south of the lake (such as in the STAs, the WCAs and in the wildlife management areas), including full utilization of the EAA and L-8 flow equalization basins. The U.S. Army Corps of Engineers can help facilitate this communication with South Florida Water Management District to ensure maximum flows south.

b. LOSOM should include added flexibility at the high end of the operational band:

1. Now that the dike rehabilitation efforts have reduced risk of breach of the Hebert Hoover Dike, the U.S. Army Corps of Engineers should raise the upper water level limit of flexibility to help prevent discharges. This should not raise the "target" level of the lake, but rather raise the level at which discharges are mandated to minimize the need for discharges and ensure a more equitable balance of the impacts to the estuaries. In short: the level at which preemptive lake releases are mandated should be raised substantially and the U.S. Army Corps of Engineers should be granted further flexibility to minimize the need of discharges.
2. When the schedule does call for regulatory discharges, the U.S. Army Corps of Engineers should be empowered with additional flexibility to reduce inflows to Lake Okeechobee. For example, the schedule could call for temporarily raising the operational levels of canals surrounding the lake. The schedule could also call for reducing the use of pump stations that move water into the lake (it is operationally self-defeating to pump water into the lake from the EAA at the same time that the water is being discharged out of the lake).

[134] Dr. Gary Goforth, *supra* note 56.
[135] *Id*.
[136] *See*, e.g., Dr. Gary Goforth, *supra* note 56.

c. LOSOM should include added flexibility at the low end of the operational band:

1. Numerous environmental groups, scientists and engineers have recognized the ecological benefits to Lake Okeechobee of periodic reductions in lake levels to allow the regrowth of vegetation.[137] Lower lake levels in the spring have also been linked to reduced algal bloom proliferation on the lake in the summer, and of course, lower lake levels heading into wet season also helps mitigate the need for discharges during wet season.[138]
2. The U.S. Army Corps of Engineers should not be restricted by an inflexible "target" that requires lake levels be held above a certain level if it is beneficial to water allocation and quality to reduce the levels further in any given year. Thus, the U.S. Army Corps of Engineers should have the built-in flexibility at the lower end of the schedule to reduce lake levels (e.g., below 11 feet heading into wet season) when it would be beneficial to do so, weighed with the need to provide water supply for municipal use and drinking water.
3. Just as at the high-end of the operational band, at the low-end of the operational band the U.S. Army Corps of Engineers should be empowered to utilize flexibility to protect impacted communities. For example, the U.S. Army Corps of Engineers should ensure that drinking water and other municipal water uses are protected during times of scarcity by accommodating these uses prior to for-profit users of water.
4. Moreover, LOSOM should include flexibility to adjust operational protocols as additional CERP and CEPP storage projects, such as the EAA Southern Storage Reservoir, are brought online.

d. LOSOM should aim to operate at routinely lower levels than LORS 2008:

1. Under LORS 2008, extreme high stage events have occurred at a far higher frequency than extreme low stage events. Over the last 11 years, discharges have occurred during 9 years while drought levels have occurred during only 1 year.[139] As a result, LORS 2008 has balanced the hypothetical, largely unrealized risk of drought against the certainty of economic and environmental devastation resulting from discharge. In turn, the lake and the region south of the lake have realized nearly all of the benefits of LORS 2008 while the communities surrounding the St. Lucie Estuary and Caloosahatchee Estuary have realized nearly all of the negative impacts.
2. To institute true shared adversity, LOSOM should lower the "target" level of the lake to mitigate the need for estuary discharges, while also protecting the ecology of the lake and other operational priorities. Perhaps most importantly, this must

[137] See, *e.g.*, Audubon Florida, *Lake Okeechobee Discharges Letter to Colonel Andrew Kelly and Drew Bartlett* (Apr 5, 2019). *See* Appendix X.
[138] Statement by Dr. Susan Gray, *Lake O Fact Check #8: How Water Levels Impact Algae Blooms* (Apr 11, 2019), https://mast.house.gov/blog?ID=75BF27B7-38A2-4C5B-B534-3742453EE8DD.
[139] Data provided by the U.S. Army Corps of Engineers.

be done with much more flexibility than under LORS 2008 so that the U.S. Army Corps of Engineers is not stuck with rigid protocols that force discharges to the estuaries in pursuit of a specific high (or low) water level when it is inadvisable or unnecessary due to other monthly or yearly predictive factors (e.g., weather patterns).

e. LOSOM should incorporate human health and safety protections:

1. The U.S. Army Corps of Engineers' contention that the "paramount consideration" of the management of Lake Okeechobee is "the reduction of flood risk" is in direct contravention of Congressional intent, which has set forth numerous, equal operational priorities.[140] That assertion is also in direct contravention to the actual operational decisions made over the last decade, which have routinely held excess water on Lake Okeechobee directly threatening the stability of the Herbert Hoover Dike. The U.S. Army Corps of Engineers must cease operating the system in complete and total deference to the water control needs of the Everglades Agricultural Area, and instead must give equal priority to water quality, Everglades restoration, public-use water supply, human health and safety needs of the rest of Florida.
2. The U.S. Army Corps of Engineers should incorporate into operational protocols efforts to mitigate the proliferation of harmful algal blooms. While LORS 2008 envisioned that pulse releases would accomplish this goal[141], the realities of the last decade have proven otherwise. The U.S. Army Corps of Engineers must work with its partners at the South Florida Water Management District, Florida Department of Environmental Protection, U.S. Environmental Protection Agency, Centers for Disease Control and Prevention, Department of the Interior and other agencies to build in true public health protections and deterrents to the proliferation of harmful algal blooms. With the overwhelming evidence cited above, claiming ignorance to the health impacts or attempting to deflect to other agencies is not an acceptable approach.
3. When discharges are necessary, the U.S. Army Corps of Engineers, South Florida Water Management District and Florida Department of Environmental Protection must work together as part of LOSOM to provide notification to impacted communities about the health impacts of contact with the cyanobacteria-infested water being released by the U.S. Army Corps of Engineers.

[140] Col. Jason Kirk, *supra* note 1.
[141] LORS, *supra* note 2.

f. LOSOM can accomplish all of these priorities with zero discharges to the St. Lucie estuary and beneficial dry-season flows to the Caloosahatchee:

1. The St. Lucie estuary was connected to Lake Okeechobee by man and has zero ecological need for any additional discharges, no matter the time of the year.[142] The current recommended 200 cfs flow to the S-80 is not grounded in science and should be reduced to zero. Moreover, the system should operate with the goal of never necessitating discharges to the St. Lucie estuary.
2. The U.S. Army Corps of Engineers should meet the minimum flow requirements of 650 to 1000 cfs to the Caloosahatchee estuary (without crossing the high flow harm threshold). The communities to the West of Lake Okeechobee want the water in these amounts during the dry season, and it's negligent to not give it to them when it is beneficial to the rest of the system also.[143] Likewise with the St. Lucie estuary, the system should be operated with the goal of never necessitating harmful wet-season discharges to the Caloosahatchee estuary.
3. Moreover, when discharges are necessitated, the U.S. Army Corps of Engineers should prioritize which areas (and in which amounts) receive harmful flows from the operations of the system based on which areas receive actual benefit from the operations of the system (i.e. water supply for irrigation, etc.). An area that receives little to no benefit, such as the communities surrounding the St. Lucie estuary, should not be burdened with the majority of the harm. This is the only way to ensure true and equitable "shared adversity."
4. Widespread risk to public health is simply not a consequence that we should be willing to accept as a result of decades of operational mismanagement.

The bottom line is that the use of taxpayer dollars to benefit private business interests cannot be placed above the public good, such as health, safety, drinking water and the environment. As the U.S. Army Corps of Engineers undertakes their rewrite of the Lake Okeechobee Regulation Schedule, changes can and should be made that prioritize public health and public use of our water.

VIII. UNRESOLVED QUESTIONS

1. How will LOSOM take into account the authorized project purpose of Water Quality?
2. How will LOSOM take into account the authorized project purpose of Preservation of Everglades National Park?
3. How will LOSOM take into account the overarching policy priority of protecting human health and safety as it applies not only to preventing flood risk but also to prevent harmful algal bloom related death and illness?

[142] Dr. Gary Goforth¸ *supra* note 59.
[143] *See*, e,g,, Appendix Y.

4. Does the U.S. Army Corps of Engineers acknowledge that the science draws a direct causal link between Lake Okeechobee discharges and the proliferation of blue-green algae in the St. Lucie and Caloosahatchee estuaries?
5. If so, what actions will the U.S. Army Corps of Engineers take to mitigate these impacts and protect the public health and safety of the communities surrounding these waterbodies?
6. Is cyanobacteria a toxin?
7. At what point, if any, is water flowing from Lake Okeechobee via the S-308 too polluted, dirty or toxic to send into the St. Lucie or Caloosahatchee estuaries?
8. Does the Indian River Lagoon contribute any nutrients or pollutants to Lake Okeechobee?
9. Given that the Environmental Protection Agency and World Health Organization have established Health Advisories for cyanobacteria, what steps will the U.S. Army Corps of Engineers take to comply with these advisories?
10. Given that the Environmental Protection Agency has a Strategic Plan for managing algal toxin risk, what steps will the U.S. Army Corps of Engineers take to comply with this strategic plan?
11. Given that the Centers for Disease Control states that Harmful Algal Blooms produce toxins that "cause illness in people," what actions will the U.S. Army Corps of Engineers take to prevent the poisoning of communities impacted by discharges?
12. Given that toxic algae in the St. Lucie River has already caused animals to die and people to get sick, what proactive steps will the U.S. Army Corps of Engineers take in LOSOM to warn the public of these health threats prior to discharging cyanobacteria-polluted water?
13. What steps will the U.S. Army Corps of Engineers take to comply with NEPA's requirement to consider "the degree to which the proposed action affects public health or safety"?
14. Does the U.S. Army Corps of Engineers consider Lake Okeechobee and the St. Lucie River/Estuary one body of water or does it acknowledge that these are separate bodies of water unnaturally connected by man?
15. What steps will the U.S. Army Corps of Engineers take to safeguard areas identified as "Outstanding Florida Waters"?
16. What steps will the U.S. Army Corps of Engineers take to safeguard the Indian River Lagoon, which has been designated an "estuary of national significance"?
17. How does the diversion of billions of gallons of polluted and toxic water comply with the U.S. Army Corps of Engineers mandate to take into consideration the human health impacts of the people surrounding the estuaries to the east and west of the lake?
18. What scientific reviews has the U.S. Army Corps of Engineers completed to study the degree to which the proposed action affects public health of the communities surrounding the St. Lucie and Caloosahatchee estuaries?

19. What scientific information is the U.S. Army Corps of Engineers relying upon to determine whether the proposed action complies with the authorized project purpose of protecting water quality in the estuaries?
20. When considering the water quality impacts of the proposed action, does the U.S. Army Corps of Engineers give at least equal weight to the impacts on the St. Lucie and Caloosahatchee estuaries as compared to Lake Okeechobee and other bodies of water in Florida?
21. To what extent does the U.S. Army Corps of Engineers include climate change modeling in your decision-making process?
22. When completing economic analysis, with what information (please cite sources) and how does the U.S. Army Corps of Engineers balance the actual realized harm to the communities surrounding the St. Lucie and Caloosahatchee estuaries with the entirely hypothetical, unrealized harm to the agricultural communities south of Lake Okeechobee?
23. How does the taxpayer-funded U.S. Army Corps of Engineers weigh public-use benefits of water against private, for-profit uses of water when making decisions about water supply?
24. Does the U.S. Army Corps of Engineers acknowledge that it is a risk to the communities surrounding Lake Okeechobee when the water levels on the lake are held too high?
25. What actions are being taken to protect the endangered and threatened species in the St. Lucie and Caloosahatchee estuaries?
26. How does the proposed action of releasing billions of gallons of polluted water comply with the Endangered Species Act and the U.S. Army Corps of Engineers NEPA requirement to consider impacts on wildlife?
27. How does the proposed action of releasing billions of gallons of polluted water comply with the authorized project purpose of enhancement of fish and wildlife?
28. Does the U.S. Army Corps of Engineers, based on the large amount of peer-reviewed and scientifically-studied material, acknowledge that it is "reasonably foreseeable" that if actions are not taken to reduce the proliferation of toxic cyanobacteria that fish and wildlife will continue to be killed off?
29. What steps are being taken as part of this proposed action to ensure full utilization of taxpayer-funded storage and treatment projects?
30. What impact will the repairs of the Herbert Hoover Dike have on the proposed action?
31. What flexibility will be built into the proposal to ensure that future storage constructed under CERP and CEPP are taken into account?
32. Does the U.S. Army Corps of Engineers acknowledge that the scientific consensus is that periodic reductions in lake levels are beneficial both to the ecology of Lake Okeechobee and the health of the estuaries?
33. Does the U.S. Army Corps of Engineers acknowledge that the scientific consensus is that no discharges are beneficial to the ecology of the St. Lucie estuary and river? If the U.S. Army Corps of Engineers disagrees with this assessment, please explain why and what your assessment is.

34. Does the U.S. Army Corps of Engineers acknowledge that the scientific consensus is that minimum dry-season flow levels of 650 to 1000 cfs would be beneficial to the ecology of the Caloosahatchee estuary? If the U.S. Army Corps of Engineers disagrees with this assessment, please explain why and what your assessment is.
35. Will the science of what amount of fresh water discharge out of Lake Okeechobee is good for, or harmful to, each estuary be taken into consideration?
36. Under LOSOM, what specific procedures will be in place to consider the proliferation of harmful algal blooms on Lake Okeechobee before discharging water into the St. Lucie or Caloosahatchee estuaries?
37. In considering alternative to the proposed action, will the U.S. Army Corps of Engineers consider a model that includes permanently removing the St. Lucie River as an option for discharging water out of Lake Okeechobee? If so, what were the impacts of doing so on the health of the St. Lucie estuary and the broader CS&F system?
38. What percentage of water entering the taxpayer funded and publicly managed stormwater treatment and water conservation areas comes off of privately-owned land in the Everglades Agricultural Area compared to water flowing from Lake Okeechobee? If private land owners in the Everglades Agricultural Area were required to provide independent retention and treatment of water used on their land how would this policy change impact the amount of water available to flow south out of Lake Okeechobee and the amount of water required to be discharged to the east and west out of the lake?
39. In the case of an extended drought period, what options are available to the U.S. Army Corps of Engineers to ensure water supply is available to public utilities, such as for drinking water?
40. In the case of high-water events what options are available to the U.S. Army Corps of Engineers to mitigate the need to discharge water into the St. Lucie and Caloosahatchee estuaries?
41. Why is the U.S. Army Corps of Engineers exempt from needing a permit under the Clean Water Act, other federal law or state law to discharge polluted water from Lake Okeechobee to the St. Lucie or Caloosahatchee estuary?
42. How is back pumping water from the Everglades Agricultural Area into Lake Okeechobee during extreme weather events consistent with the U.S. Army Corps of Engineers' mission as it relates to the stability of the Hebert Hoover Dike?
43. Has the U.S. Army Corps of Engineers ever been required to or actually did obtain a permit for discharging water as part of the CS&F project?
44. Over the operational history of LORS 2008, did the U.S. Army Corps of Engineers make operational suggestions to the South Florida Water Management District that would have increased the U.S. Army Corps of Engineers capacity to move water south from Lake Okeechobee or otherwise decreased the need to discharge water to the estuaries that were not implemented by South Florida Water Management District? If so, what were they?
45. Does the U.S. Army Corps of Engineers acknowledge that the results of LORS 2008 created 9 years of discharge and only 1 year of drought levels? If so, does the U.S. Army Corps of Engineers believe this is an equitable distribution of shared adversity?

46. Does the U.S. Army Corps of Engineers believe that widespread risk to public health, such as is created by the discharge of toxic algal blooms in the estuaries, is an acceptable result of LOSOM?

IX. CONCLUSION

In conclusion, LORS 2008 has caused substantial damage to the environment in Florida and also to the public health of Florida's inhabitants. The design has forced water where it is not wanted (and extremely harmful) and starved the areas that do want the water.[144] As a result, the St. Lucie estuary, which historically received no freshwater flows, is flooded with billions (or hundreds of billions) of gallons of polluted fresh water each year.[145]

The U.S. Army Corps of Engineers operational priorities, along with the requirements under NEPA, provide important guardrails to ensure that a system as fundamentally flawed as LORS 2008 is never allowed to happen again. Instead, the U.S. Army Corps of Engineers should design a system that includes substantially added flexibility ensuring maximum flows south of the lake and minimum flows to the estuaries. This can be accomplished through added flexibility at both the high and low ends of the system, and an overall lower operational level for Lake Okeechobee than under LORS 2008. Moreover, the U.S. Army Corps of Engineers must incorporate specific and stringent safeguards to protect Florida communities from the dangerous health impacts of exposure to the toxins contained in these discharges. Ultimately, the goal must be zero discharges to the St. Lucie and only the beneficial dry-season flows requested by the Caloosahatchee.

The public health consequences of the project you are undertaking could not be more severe. This is truly a life or death proposition for Florida's environment, our economy, the people that call Florida home and the millions of visitors we receive every year.

[144] Rehage, *supra* note 57.
[145] Data provided by the U.S. Army Corps of Engineers.