TULANE LAW SCHOOL

TULANE ENVIRONMENTAL LAW CLINIC

February 4, 2020

Via Email to: *DEQ.Reg.Dev.Comments@la.gov*
Ms. Deidra Johnson, Attorney Supervisor
Office of the Secretary, Legal Affairs and Criminal Investigations Division
P.O. Box 4302
Baton Rouge, LA 708021-4302

RE: Comments on WQ097, Water Quality Standards Triennial Review

Dear Ms. Johnson,

Please consider the following comments on the Louisiana Department of Environmental Quality's (LDEQ's) December 20, 2019, Notice of Intent of Louisiana's Triennial Review of its Water Quality Standards. The Tulane Environmental Law Clinic submits these comments on behalf of Healthy Gulf,[1] the Louisiana Environmental Action Network (LEAN),[2] the Louisiana Audubon Council,[3] and the Sierra Club Delta Chapter[4] (collectively "Citizen Groups"). Citizen Groups reserve the right to rely on all public comments submitted. We request a written response to all comments.

SUMMARY

The Clean Water Act requires states to conduct triennial reviews of their water quality standards. 33 U.S.C. § 1313(c)(1), Clean Water Act ("the Act") § 303(c)(1). Specifically, the Act requires that states "hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards." *Id.*; *see also* 40 C.F.R.

[1] Healthy Gulf is a non-profit corporation organized under the laws of the State of Louisiana. Healthy Gulf, a regional coalition of almost fifty environmental and social justice groups, is committed to the protection and restoration of the resources of the Gulf of Mexico region. Healthy Gulf staff provides technical assistance and support to communities in the states bordering the Gulf in opposing environmental threats to local water bodies that jeopardize their communities.
[2] LEAN is a non-profit corporation organized under the laws of the State of Louisiana. LEAN serves as an umbrella organization for environmental and citizen groups. LEAN's purpose is to preserve and protect the state's land, air, water, and other natural resources, and to protect its members and other residents of the state from threats of pollution. LEAN has members statewide, including members who live, work, or recreate in the area of the proposed DO criteria revisions.
[3] The Louisiana Audubon Council is a non-profit 501(c)(4) organization comprised of Audubon Chapters and National Audubon Society members. Since its organization in 1989, the Louisiana Audubon Council has been involved in protecting wetlands and water quality throughout the state,
[4] The Sierra Club, Delta Chapter, is a non-profit 501(c)(4) organization comprised of Sierra Club members in Louisiana.

§131.20(a). Thus the public may comment on, and propose changes to, all water quality standards, even those which LDEQ has not proposed to change. For twenty-six waterbody subsegments in the Lake Pontchartrain Basin, LDEQ has not proposed changes in this triennial review to the currently-applicable water quality standards. *See* WQ097 at §1123, Table 3; La. Admin. Code tit. 33, Pt. IX (October 2019)(current version of water quality standards). In the currently applicable standards, LDEQ indicates that the dissolved oxygen (DO) criteria for these waters is 2.3 mg/L from March through November. La. Admin. Code tit. 33, pt. IX, §1123, Table 3. These subsegments are: 040201, 040303, 040306, 040402, 040403, 040404, 040503, 040508, 040601, 040606, 040702, 040705, 040809, 040907, 040915, 040916, 040917, 041101, 041201, 041202, 040807, 040808, 040903, 040912, 040913, and 040914. However, for these twenty-six waterbody subsegments, plus an additional five which LDEQ proposes to change in this rulemaking (040305, 040401, 040506, 040604, 040605), the legally-applicable and appropriate DO criterion is 5.0 mg/L year-round (4.0 mg/L for estuarine waters). Collectively, these 31 waterbodies compose the eastern Lower Mississippi River Alluvial Plains Ecoregion (eLMRAP).

In fact, on February 25, 2019, a federal court vacated LDEQ's site-specific 2.3 mg/L DO standard for these 31 waterbodies and remanded the matter to EPA for further proceedings. *See* Exhibit A. EPA has yet to publish or complete any new action approving or disapproving those standards, adopted by LDEQ in December 2015 as WQ091.

In this rulemaking, LDEQ should list the applicable water quality standard for these 31 waters as 5.0 mg/L for freshwaters and 4.0 for estuarine, both because that is the legally-applicable standard since the federal court vacated the 2.3 standard and because 5.0 mg/L (4.0 for estuarine) DO year-round is required to protect the designated uses. These comments will focus on the adverse impacts that 2.3 mg/L of DO is likely to have on species listed under the Endangered Species Act. We also attach, by reference, our September 4, 2015, comments on WQ091 regarding the additional reasons that a 2.3 mg/L DO standard violates the Clean Water Act. EDMS Doc # 10040577.

A DO criteria of 2.3 mg/L from March through November in the eLMRAP ecoregion ("lowered criteria") would adversely affect both the Alabama heelsplitter (*Potamilus inflatus*) and the Gulf sturgeon (*Acipenser oxyrhynchus desotoi*). The Alabama heelsplitter and the Gulf sturgeon are both listed as threatened species under the Endangered Species Act. Imposition of the lowered criteria in the eLMRAP ecoregion will also result in the destruction and/or adverse modification of critical habitat for the Gulf sturgeon. The Alabama heelsplitter and the Gulf sturgeon occur in many of the waterbody subsegments to which the revised criteria apply, and the revised criteria apply to subsegments designated as critical habitat.

Evidence suggests that drastically lowering the DO criteria in the eLMRAP ecoregion will adversely affect the Alabama heelsplitter, particularly during species recruitment by degrading water quality and creating an inhabitable environment for the species' host fish. Evidence also indicates that drastically lowering the DO criteria in the eLMRAP ecoregion will jeopardize and adversely affect the Gulf sturgeon, during the most susceptible stages of its life cycle – larval and juvenile stages.

The revised dissolved oxygen criteria will most likely result in the adverse modification of the Gulf sturgeon's critical habitat, violating Section 7(a)(2) of the Endangered Species Act. Reducing the DO standard from 5.0 mg/L to 2.3 mg/L for nine months of the year in these subsegments will constitute an adverse modification to the Gulf sturgeon's critical habitat.

SPECIFIC COMMENTS

1. LDEQ'S PROPOSED CRITERIA WILL ADVERSELY AFFECT BOTH THE ALABAMA HEELSPLITTER AND THE GULF STURGEON.

LDEQ's proposal to lower the DO criteria in the eLMRAP ecoregion to 2.3 mg/L will adversely affect both the Alabama heelsplitter and the Gulf sturgeon. Both the Alabama heelsplitter and the Gulf sturgeon are known to occur in waterbodies to which the revised criteria apply. Sufficient levels of DO in the water are essential to the survival and recovery of the Alabama heelsplitter and the Gulf sturgeon. Furthermore, DO levels of 2.3 mg/L from March through November are insufficient for the survival, recovery, and conservation of the Alabama heelsplitter and the Gulf Sturgeon.

The Alabama heelsplitter and the Gulf sturgeon are both listed as threatened under the Endangered Species Act. In a letter to EPA, FWS stated that it believed the proposed change in DO levels to 2.3 mg/L throughout the eLMRAP ecoregion from March-November may cause adverse effects to the Alabama heelsplitter within stream segment 040306 of the Amite River and to the Atlantic sturgeon in multiple stream segments within the Lake Pontchartrain Basin.[5]

A. The Alabama Heelsplitter and the Gulf Sturgeon Inhabit Rivers Within the Eastern Lower Mississippi River Alluvial Plains (eLMRAP) Ecoregion.

Presently, the known distribution of the Alabama heelsplitter in Louisiana is limited to the Amite and Pearl Rivers.[6] Within the Amite River the Alabama heelsplitter can be found in the lower and mid reaches.[7] In FWS's 5-Year Review of the Alabama heelsplitter, the agency

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[5] *See* Letter from Joseph A. Ranson, Field Supervisor, Louisiana Ecological Services Office, Fish and Wildlife Service, to William K. Honker, Director, Water Division, Environmental Protection Agency Region 6 (January 24, 2018) (Attached as Exhibit B).

[6] *See* U.S. Fish and Wildlife Service, *Recovery Plan Inflated Heelsplitter (Potamilus inflatus)*, 1 (1992) ("The presently known distribution is limited to the Amite River, Louisiana, and the Tombigbee and Black Warrior Rivers, Alabama."); *see also* Louisiana Department of Wildlife and Fisheries *et al.*, *Conservation of At-Risk Species in Louisiana*, 1, 30 (September 2009) ("[T]he Alabama (=inflated) heelsplitter mussel (*Potamilus inflatus*) occurs in the Amite and Pearl Rivers in Louisiana."); *see also* Louisiana Department of Wildlife and Fisheries and the Barataria-Terrebonne National Estuary Program, *Rare Animals of Louisiana*, *http://www.wlf.louisiana.gov/sites/default/files/pdf/fact_sheet_animal/32154-Potamilus%20inflatus/potamilus_inflatus.pdf.*

[7] *See* U.S. Environmental Protection Agency Biological Evaluation of the Revised Louisiana Water Quality Standards, *DO Criteria Revisions for Eastern Lower Mississippi River Alluvial Plains Ecoregion (LAC 33:IX:1123)(Rule WQ091)* 1, 23 (Oct. 5, 2017).

also recognized the occurrence of the Alabama heelsplitter in the Pearl and Amite Rivers.[8] Additionally, FWS considered the population in the lower reaches of the Amite River to be viable and self-sustaining.[9]

Gulf sturgeon have been known to occur from the Mississippi River east to Tampa Bay.[10] Presently, the range extends "from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida.[11]" In Louisiana, the Louisiana Department of Wildlife and Fisheries (LDWF) has recorded Gulf sturgeon in the Pearl, Bogue Chitto, and Tchefuncte Rivers.[12] The LDWF has also recognized that the Gulf sturgeon "is likely to be found in any large river in the Lake Pontchartrain drainage."[13]

Prior to hurricanes in 2005, 2008, and 2012 sturgeon were spotted in the western most drainages of the Amite and Tickfaw rivers into Lake Pontchartrain.[14] A report by Reynolds (1993) indicates the presence of Gulf sturgeon in Lakes Pontchartrain and Maurepas, and in certain river systems such as, the Mississippi River and the Tchefuncte River system.[15] Additionally, the Louisiana Ecological Services office of the FWS recently included a list of subsegments considered to be sensitive areas for the Gulf sturgeon, this list includes the

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[8] *See Inflated Heelsplitter Mussel (Potamilus inflatus) 5-Year Review*, U.S. Fish and Wildlife Service Southeast Region Alabama Ecological Services Field Office Daphne, Alabama, at 5, available at https://ecos.fws.gov/docs/five_year_review/doc5817.pdf.
[9] *Id.*
[10] *See* U.S. Fish and Wildlife Service Louisiana Ecological Services Field Office, *Biological Opinion: Pearl River Watershed, Hinds and Rankin Counties, Mississippi Flood Reduction Project*, FWS Log #: 04EL1000-2020-F-0109, 31 (Oct. 23, 2019).
[11] *Id.*
[12] *See* Louisiana Department of Wildlife and Fisheries and the Barataria-Terrebonne National Estuary Program, *Rare Animals of Louisiana*, http://www.wlf.louisiana.gov/sites/default/files/pdf/fact_sheet_animal/32188-Acipenser%20oxyrinchus%20desotoi/acipenser_oxyrinchus_desotoi.pdf.
[13] *Id.*; *see also* Kenneth J. Sulak *et al*., *Status of scientific knowledge, recovery progress, and future research directions for the Gulf Sturgeon, Acipenser oxyrinchus desotoi Vladykov, 1995*, 32 J. Appl. Ichthyol. 87, 94 (2016) (Major tributaries of the Pearl river include the Bogue Chitto, Yockanookanay, Strong, Tchefuncte, Tangipahoa, Tickfaw, and Amite rivers).
[14] *See* Bobby C. Reed, *Louisiana Gulf Sturgeon Conservation Plan*, Louisiana Department of Wildlife and Fisheries, 24 (May 2015).
[15] *See* Charles R. Reynolds, *Gulf Sturgeon Sightings: A Summary of Public Responses*, Pub. No. PCFO-FR 93-01 (April 1993); *see also* Kenneth J. Sulak *et al*., *Status of scientific knowledge, recovery progress, and future research directions for the Gulf Sturgeon, Acipenser oxyrinchus desotoi Vladykov, 1995*, 32 J. Appl. Ichthyol. 87, 89 (2016). ("Incidental record from non-spawning [Gulf of Mexico] rivers have been reported for . . . the Atchafalaya, Amite, Tangipahoa, Tchefuncte, and Tickfaw rivers in Louisiana.").

Tchefuncte River.[16] Moreover, a Gulf sturgeon has recently been observed on March 11, 2019 at the Bonnet Carre Spillway and several others have been observed prior to 2016 by LDWF.[17]

C. The Alabama Heelsplitter is Sensitive to Ambient Conditions of Oxygen.

The Alabama heelsplitter faces various threats, among them is the degradation of water quality.[18] The EPA has acknowledged that the Alabama heelsplitter exhibits a negative response to low DO levels.[19] Research in freshwater mussels suggests that lotic[20] species like the Alabama heelsplitter have higher oxygen requirements and are more susceptible to oxygen debt compared to lentic[21] species.[22] Studies indicate that mussels cannot survive at DO levels below 5 mg/L and that no living mussels are found where DO levels drop to 3 mg/L.[23]

The FWS has indicated to EPA and LDEQ that a seasonal DO criterion of 2.3 mg/L would be too low for the protection of any freshwater mussel species.[24] It is important to note that the observation of mussels in a particular environment is not evidence that the species can survive and reproduce in that particular environment. Roley and Tank (2016) noted that "there is often a temporal lag between the onset of stressors and a perceived decline in the mussel population, because mussels are generally long-lived and can survive for decades . . . Juveniles are more vulnerable to many threats than are adults, and low recruitment will eventually lead to population declines, although declines may not be evident until long after a stressor occurred.[25]"

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[16] *See 2015-2016 Implementation Strategy for the Louisiana Department of Environmental Quality and the U.S. Fish and Wildlife Service Memorandum of Understanding*, at 3-5 (Tchefuncte River listed as subsegment 040801, part of which is now designated as 040807).
[17] This information was obtained through a public records request by the Tulane Environmental Law Clinic and has been attached as Exhibit C.
[18] Louisiana Department of Wildlife and Fisheries *et al.*, *Conservation of At-Risk Species in Louisiana*, 1, 30 (September 2009).
[19] *See* U.S. Environmental Protection Agency Biological Evaluation of the Revised Louisiana Water Quality Standards, *DO Criteria Revisions for Eastern Lower Mississippi River Alluvial Plains Ecoregion (LAC 33:IX:1123)(Rule WQ091)* 1, 34 (Oct. 5, 2017).
[20] Lotic refers to running water habitats, such as rivers and streams. *See* Marsh G.A., Fairbridge R.W. (1999) Lentic and lotic ecosystems. In: Environmental Geology. Encyclopedia of Earth Science. Springer, Dordrecht.
[21] Lentic refers to standing waters, such as lakes, ponds, swamps, or marshes. *See* Marsh G.A., Fairbridge R.W. (1999) Lentic and lotic ecosystems. In: Environmental Geology. Encyclopedia of Earth Science. Springer, Dordrecht.
[22] Sheldon, F., Walker, K.F. (1989) Effects of Hypoxia on Oxygen consumption by two species of Freshwater Mussel (Unionacea: Hyriidae) from the River Murray. Marine and Freshwater Research 40, 491, 497.
[23] U.S. Environmental Protection Agency Biological Evaluation of the Revised Louisiana Water Quality Standards, *DO Criteria Revisions for Eastern Lower Mississippi River Alluvial Plains Ecoregion (LAC 33:IX:1123)(Rule WQ091)* 1, 34 (Oct. 5, 2017).
[24] This information was obtained through a Freedom of Information Act Request by the Tulane Environmental Law Clinic and has been attached as Exhibit D.
[25] Roley, S.S., Tank, J.L. (2016) Pore water physicochemical constraints on the endangered clubshell mussel (Pleurobema clava). Canadian Journal of Fisheries and Aquatic Sciences, 73: 1712 ("juveniles are

Additionally, the FWS has also stated that DO levels below 4 mg/L may not be adequate for fish species that serve as hosts for molluscan larvae.[26] The Alabama heelsplitter like all freshwater mussels, relies upon a fish host to support its "glochidia life stage" for successful reproduction.[27] The Alabama heelsplitter's only known fish host is the freshwater drum (*Aplodinotus grunniens*).[28] The distribution of freshwater drum in Louisiana is strongly associated with DO levels, with the drum being less abundant in hypoxic bayous (<2.0 mg/L).[29] A recent study of the drum indicated that the species was relatively rare in the Amite River, which may contribute to the threatened status of the Alabama heelsplitter.[30]

D. Gulf Sturgeon are Sensitive to Ambient Conditions of Oxygen.

The National Oceanic and Atmospheric Administration (NOAA) has acknowledged that "high temperatures, low DO, and high salinities [has resulted] in lower survival of Gulf sturgeon. " [31] NOAA and the FWS have also recognized that Gulf sturgeon "egg and larval development can be vulnerable to various forms of pollution, temperature, and [DO] levels."[32] The FWS has acknowledged that DO levels are important for the feeding and survival of juvenile sturgeon.[33] Relying upon Secor and Gunderson (1998) the FWS concluded that "[j]uveniles were more

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typically less tolerant of low DO (Dimock and Wright 1993; Sparks and Strayer 1998), which can limit subsequent recruitment.").

[26] *See* Exhibit D.

[27] Louisiana Department of Wildlife and Fisheries *et al.*, *Conservation of At-Risk Species in Louisiana*, 1, 30 (September 2009).

[28] Kenneth M. Brown & Wesley M. Daniel, *The Population Ecology of the Threatened Inflated Heelsplitter, Potamilus inflatus, in the Amite River, Louisiana*, 171 The American Midland Naturalist, 328, 329 (February 2014).

[29] Rutherford, D.A., Gelwicks, K.R. and Kelso, W.E. (2011), Physicochemical Effects of the Flood Pulse on Fishes in the Atchafalaya River Basin, Louisiana. Transactions of the American Fisheries Society, 130: 276-288.

[30] Brown, K.M., and Daniel, W.M. (2014) The Population Ecology of the Threatened Inflated Heelsplitter, Potamilus inflatus, in the Amite River, Louisiana. The American Midland Naturalist, 171: 328-339.

[31] *See* Jason Kahn & Malcolm Mohead, *A Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons*, NOAA Technical Memorandum NMFS-OPR-45, 3 (2010); *see also* Edwin J. Niklitschek & David H. Secor, *Modeling spatial and temporal variation of suitable nursery habitats for Atlantic sturgeon in the Chesapeake Bay*, 64 Estuarine, Coastal and Shelf Science 135, 137 (2005) (Figure 1 depicts the loss of productivity of sturgeon as dissolved oxygen saturation decreases and temperature increases).

[32] *See* U.S. Fish and Wildlife Service Louisiana Ecological Services Field Office, *Biological Opinion: Pearl River Watershed, Hinds and Rankin Counties, Mississippi Flood Reduction Project*, FWS Log #: 04EL1000-2020-F-0109 (Oct. 23, 2019).

[33] *See* U.S. Fish and Wildlife Service Louisiana Ecological Services Field Office, *Biological Opinion: Pearl River Watershed, Hinds and Rankin Counties, Mississippi Flood Reduction Project*, FWS Log #: 04EL1000-2020-F-0109 at 42 (Oct. 23, 2019) ("According to this [study], reduced oxygen levels resulted in a threefold reduction in growth rate and a reduction in routine respiration rates").

vulnerable to low DO levels and high temperatures."[34] The FWS also noted that sturgeon in the Secor and Gunderson (1998) experiment experienced growth under hypoxic conditions, however, it failed to note that a majority of the sturgeon died within ten days.[35]

The LDEQ and the FWS have stated that water quality, including oxygen content, is an essential element to the conservation of Gulf sturgeon.[36] Experiments demonstrated "critical concentrations of DO between 4.3 and 4.7 mg/L" for shortnose and Atlantic sturgeon "with temperatures ranging from 22º and 27º C respectively.[37]" Experiments have also revealed that survival of Atlantic sturgeon drops as temperature increases and dissolved oxygen decreases.[38] Additionally, Dr. Kimberly Terrell, the Director of Community Outreach at Tulane University's Environmental Law Clinic with a Ph.D. in conservation biology, stated in a sworn affidavit that the best available science suggests that DO levels below 5 mg/L will increase mortality in natural populations of Gulf sturgeon.[39] Although specific dissolved oxygen tolerances have yet to be established for the Gulf sturgeon, hypoxia for many *Acipenser* species has been recorded at 4 mg/L.[40]

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[34] *See* David H. Secor & Troy E. Gunderson, *Effects of hypoxia and temperature on survival, growth, and respiration of juvenile Atlantic sturgeon, Acipenser oxyrinchus*, 96 Fishery Bulletin 603, 609 (1998) (Authors defined hypoxia as a dissolved oxygen concentration which is less than 4 mg/L, but acknowledge that hypoxia has previously been defined as less than 2 mg/L for Chesapeake Bay, however 2 mg/L may be too stringent for fishes because oxygen concentrations at this level are often lethal).
[35] *Id*.
[36] *See 2015-2016 Implementation Strategy for the Louisiana Department of Environmental Quality and the U.S. Fish and Wildlife Service Memorandum of Understanding*, at 6;
[37] *See* Jason Kahn & Malcolm Mohead, *A Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons*, NOAA Technical Memorandum NMFS-OPR-45 at 4 (2010).
[38] *Id*.; *See* Jed G. Campbell & Larry R. Goodman, *Acute Sensitivity of Juvenile Shortnose Sturgeon to Low Dissolved Oxygen Concentrations*, 133 Transactions of the American Fisheries Society 722 (2004) ("juvenile shortnose sturgeon up to 134 [days] old are quite sensitive to low [dissolved oxygen] in acute tests at low salinities"); *See* David H. Secor & Troy E. Gunderson, *Effects of hypoxia and temperature on survival, growth, and respiration of juvenile Atlantic sturgeon, Acipenser oxyrinchus*, 96 Fishery Bulletin 603 (1998); *See also* David H. Secor & Edwin J. Niklitschek, *Hypoxia and Sturgeons: report to the Chesapeake Bay Program Dissolved Oxygen Criteria Team*, UMCES Tech. Ser. No. TS-314-01-CBL (2001) ("Behavioral studies indicate that Atlantic sturgeon and shortnose sturgeon are quite sensitive to ambient conditions of oxygen and temperature"); *See also* Joseph J. Cech & Serge I. Doroshov, *Sturgeons and Paddlefish of North America*, 77-78 (G.T.O. LeBreton *et al.* eds. 2004) ("Sturgeon are typically sensitive to dissolved [oxygen] decreases and hypoxic conditions impair their respiratory metabolism, foraging activity, and growth rates.").
[39] *See* Exhibit E.
[40] *See* Jason Kahn & Malcolm Mohead, *A Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons*, NOAA Technical Memorandum NMFS-OPR-45 (2010) at 5 ("[National Marine Fisheries Service] recommends not capturing or handling Gulf, Atlantic and shortnose sturgeon when [dissolved oxygen] concentrations are below 5 mg/L"); *see also* U.S. Fish and Wildlife Service Louisiana Ecological Services Field Office, *Biological Opinion: Pearl River Watershed, Hinds and Rankin Counties, Mississippi Flood Reduction Project*, FWS Log #: 04EL1000-2020-F-0109 at 42 (Oct. 23, 2019) ("Although specific [dissolved oxygen] tolerance levels have not been established for Gulf sturgeon, hypoxia for other *Acipenser* species have been documented to start 4 milligrams per liter (mg/L)."

In the 2009 Five-Year Review FWS acknowledged that sturgeon exposed to low dissolved oxygen levels experienced "reduced swimming and feeding activity coupled with increased ventilation frequency."[41] Moreover, the Environmental Protection Agency (EPA) has examined the effects of low dissolved oxygen on sturgeon in its 2003 Guidance on recommended water quality criteria for the Chesapeake Bay. In the 2003 Guidance the EPA stated: "Sturgeon in Chesapeake Bay and elsewhere are more sensitive to low [DO] conditions than most other fish. In comparison with other fishes, sturgeon have a limited behavioral and physiological capacity to respond to hypoxia."[42] This information continues to hold true, as there have been no recent studies to refute the above findings that sturgeon are sensitive to low DO levels.

Recently the EPA attempted to demonstrate that DO levels as low as 2.3 mg/L from March-November are not likely to adversely affect the Gulf sturgeon.[3] However, this analysis was flawed in numerous ways.[4] The FWS contested EPA's Biological Evaluation stating that lower DO criteria in the eLMRAP ecoregion would jeopardize and adversely affect the sturgeon. FWS relied on the 2007 status review of the Atlantic sturgeon stating that "juvenile Atlantic sturgeon are less tolerant to summer-time hypoxia than juveniles of other estuarine species.[5]" FWS stressed that lower DO would adversely affect sturgeon during the sturgeon's most susceptible life stage – larval and juvenile.[6]

2. LDEQ'S CRITERIA WILL RESULT IN THE DESTRUCTION OR ADVERSE MODIFICATION OF CRITICAL HABITAT.

The lowered dissolved oxygen criteria is likely to result in the adverse modification of Gulf sturgeon critical habitat, in violation of Section 7(a)(2) of the Endangered Species Act (ESA). Section 7(a)(2) of the ESA states that "each federal agency . . . shall insure that any action authorized, funded or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical."[43] Further, ESA regulations at 50 C.F.R. § 402.02 define destruction or adverse modification as including indirect alterations which alter "physical and biological features essential to the conservation of a species or that preclude or significantly delay development of such features." FWS has explained that it will "generally conclude that a Federal action is likely to 'destroy or adversely modify' designated critical habitat if the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, and if the effect of the alteration is to appreciably diminish the value of critical habitat for the conservation of a species."[44] Additionally, FWS has designated areas of critical habitat for the Gulf sturgeon and described "Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen

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[41] *See Gulf Sturgeon (Acipenser oxyrinchus desotoi) 5-Year Review*, U.S. Fish and Wildlife Service & National Marine Fisheries Service, September 2009, at 19.
[42] *See Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chloropyll a for the Chesapeake Bay and it Tidal Tributaries*, USEPA, April 2003, at 28, *available at* http://www.chesapeakebay.net/content/publications/cbp_13142.pdf.
[43] 16 U.S.C § 1536 (a)(2).
[44] 81 Fed. Reg. 7214-01, 7216.

content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages" as one of seven primary constituent features it considered in its designation.[45]

Sufficient levels of dissolved oxygen in the water are essential to the survival and recovery of the Gulf sturgeon. In an EPA study, the agency commented that low DO levels ranging from 2.8 mg/L - 3.3 mg/L can result in "complete mortality" for young stages of Atlantic sturgeon exposed for ten days.[46] The study also stated that "Sturgeon in Chesapeake Bay and elsewhere are more sensitive to low dissolved oxygen conditions than most other fish. In comparison with other fishes, sturgeon have a limited behavioral and physiological capacity to respond to hypoxia."[47] Similarly, in a 2007 Status Review of the Atlantic sturgeon, the FWS stated that "juvenile Atlantic sturgeon are less tolerant of summer-time hypoxia than juveniles of other estuarine species," and in order to mitigate unnecessary risk to such susceptible life stages, "most Atlantic states impose work restrictions during sensitive time periods (spawning, migration, feeding) when anadromous fish, [like the Gulf sturgeon] are present."[48] In fact, in the Status Review, the Services commented approvingly on EPA's Chesapeake Bay criteria, finding:

> [T]he EPA adjusted their open water minimum DO- criteria for the Chesapeake Bay (increased from ~2 ppm to 3.5 ppm) to provide protection specifically for sturgeon species, which require higher levels of DO compared to other fish species. Niklitschek and Secor (2005) found that achieving EPA's new DO-criteria, would increase Atlantic sturgeon available habitat by 13% per year, while an increase of water temperature by just 1◦ C would reduce available habitat by 65%. **Similar results may occur in southern rivers where high water temperatures and low DO are a common occurrence during the summer months.**[49]

Sixteen subsegments to which the LDEQ's revised criteria apply are listed as critical habitat for the Gulf sturgeon pursuant to the Endangered Species Act. In fact, FWS has listed subsegments 040302 (part of which is now 040306), 040305, 040401, 040402, 040503 (part of which is now 040507), 040505 (part of which is now 040508), 040601, 040604, 040702, 040801 (part of which is now 040807), 040802 (which is now 040808), 040901 and 040902 (part of which are now 040912 and 040913), 040904 (part of which is now 040914), 040905 (part of which is now included in 040915), and 040908 (part of which is now included in 040917) as designated critical habitat for the species and reported sightings of the species in the rivers and lakes of the Lake Ponchartrain Basin.[50]

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[45] *See* 50 CFR § 226.214.
[46] EPA *supra* note 42, at 29.
[47] *Id.* at 28.
[48] *See* Atlantic Sturgeon Review Team, Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus) at 34 (2007), *https://repository.library.noaa.gov/view/noaa/16197*.
[49] *Id.* (emphasis added).
[50] *See* 2015-2016 Implementation Strategy for the Louisiana Department of Environmental Quality and the U.S. Fish and Wildlife Service Memorandum of Understanding (May 18, 2016) (attached as Exhibit F).

For these reasons, reducing the dissolved oxygen standard from 5.0 mg/L to 2.3 mg/L for nine months of the year in the eLMRAP region will likely result in an adverse modification to the Gulf Sturgeon's critical habitat.

CONCLUSION

LDEQ's lowered DO standard of 2.3 mg/L March-November will not only adversely affect endangered species in the eastern Lower Mississippi River Alluvial Plains ecoregion, but it will also result in the destruction or adverse modification of critical habitat. Accordingly, LDEQ must. Additionally, a federal court has vacated those standards. Accordingly, LDEQ must, in this triennial review, list the DO criteria for these 31 waterbodies as 5.0 mg/L year-round (4.0 for estuarine water).

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cc (by email): [F&WS & EPA]

 Exhibit A

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF LOUISIANA

GULF RESTORATION NETWORK, ET AL	**CIVIL ACTION**
VERSUS	**NO: 18-1632**
U.S. ENVIRONMENTAL PROTECTION AGENCY, ET AL	**SECTION: "S" (5)**

ORDER AND REASONS

IT IS HEREBY ORDERED that defendants' **Motion for Voluntary Remand Without Vacatur** (Rec. Doc. 46) is **granted in part**;

IT IS FURTHER ORDERED that plaintiff's **Motion for Partial Summary Judgment** (Rec. Doc. 47) is **denied as moot**.

Before the court are two motions, defendants' Motion for Voluntary Remand Without Vacatur, and Plaintiff's Motion for Partial Summary Judgment. Having reviewed the record, the memoranda of counsel, and applicable law, the court finds that the parties are in agreement that remand is inevitable; the only question is whether the remand should be voluntary as requested by defendants, or subsequent to a finding that EPA is violation of section 7(a)(2) of the Endangered Species Act, 16 U.S.C. § 1536(a)(2), as requested by plaintiffs, and whether the remand should be with or without vacatur.

A more detailed recitation of background facts has been set forth by the court in its prior Order and Reasons (Rec. Doc.33), and is incorporated by reference. For purposes of the instant motions, the crucial fact is that the parties actually differ on very little: the EPA acknowledges

that is in violation of section 7(a)(2) of the Endangered Species Act ("ESA"), and that remand and reconsideration at the agency level is necessary. In support of their motion, EPA submitted the affidavit of Louisiana Department of Environmental Quality ("LDEQ") Secretary Chuck Carr Brown, who has averred that the lowered dissolved oxygen "DO" standard challenged by plaintiffs is currently incorporated in one Lousiana Pollutant Discharge Elimination System permit, and that if the matter is remanded, the LDEQ would forego incorporating the lowered DO standard into any further permits during the remand period. Thus, in essence, the EPA has consented to a partial vacatur. Moreover, plaintiffs do not appear to take issue with the new sub-segment boundaries, except to the extent they incorporate the lowered DO standard, suggesting that not vacating the new sub-segment boundaries is acceptable to them.

Absent a specific statutory limitation, an administrative agency has the inherent authority to reconsider its decisions. Macktal v. Chao, 286 F.3d 822, 825–26 (5th Cir. 2002); see also, Frito-Lay, Inc. v. U.S. Dep't of Labor, 20 F. Supp. 3d 548, 552 (N.D. Tex. 2014). Even in the absence of new evidence or an intervening event . . . courts retain the discretion to remand an agency decision when an agency has raised "substantial and legitimate" concerns in support of remand. Carpenters Indus. Council v. Salazar, 734 F. Supp. 2d 126, 132 (D.D.C. 2010). Granting voluntary remand in such cases preserves scarce judicial resources by allowing agencies "to cure their own mistakes." Id. (citing Ethyl Corp. v. Browner, 989 F.2d 522, 524 (D. C. Cir.1993).

Considering that they have acknowledged that they failed to follow the requirements of section 702(a), the court finds that defendants have raised substantial and legitimate concerns in support of remand. As for vacatur, because (with the exception of the DO standard related to one

permit) there is essential agreement between the parties, a partial vacatur is appropriate. Accordingly,

IT IS ORDERED that defendants' Motion for Voluntary Remand Without Vacatur (Rec. Doc. 46) is granted in part, and this matter is hereby **REMANDED** to the agency for further proceedings consistent with this order.

IT IS FURTHER ORDERED that the remand is made subject to a **PARTIAL VACATUR**, vacating the new DO standard except in connection with the one permit in which it has been incorporated, and maintaining the new water body boundaries, pending reconsideration on remand;

IT IS FURTHER ORDERED that plaintiff's Motion for Partial Summary Judgment (Rec. Doc. 47) is denied as moot.

New Orleans, Louisiana, this 25th day of February, 2019.

MARY ANN VIAL LEMMON
UNITED STATES DISTRICT JUDGE

Terrell, Kimberly A

From: Michael Harden <mharden@wlf.la.gov>
Sent: Thursday, May 30, 2019 7:14 AM
To: Richard Moses
Cc: Nicole Smith (WLF)
Subject: RE: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel
Attachments: Gulf Sturgeon and Alabama Heelsplitter data_053019.xlsx

We've got one sturgeon observed since 2016(several prior to this) and three P. inflatus in mussels monitoring. Data is attached.

Mike

From: Richard Moses
Sent: Wednesday, May 29, 2019 9:14 AM
To: Michael Harden <mharden@wlf.la.gov>
Cc: Nicole Smith (WLF) <nsmith@wlf.la.gov>
Subject: FW: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Mike

I am not sure if you have received anything from Nicole concerning the attached public records request. Please review the approval email chain below and provide any data we have in the DMS.

Thanks
RDM

Richard Moses
LA Department of Wildlife and Fisheries
rmoses@wlf.la.gov
www.wlf.louisiana.gov
P.O. Box 98000
Baton Rouge, LA 70898 - 9000
225.765.2331 Ext. 1301

From: Jason Duet (WLF)
Sent: Wednesday, May 29, 2019 8:48 AM
To: Richard Moses <rmoses@wlf.la.gov>
Cc: Michael Harden <mharden@wlf.la.gov>

Subject: RE: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Ok you can reach out to Mike Harden for assistance if you all have not already. Thanks.

From: Richard Moses <rmoses@wlf.la.gov>
Sent: Wednesday, May 29, 2019 8:46 AM
To: Jason Duet (WLF) <jduet@wlf.la.gov>
Subject: RE: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Jason

Yes we will.

Thanks
RDM

Richard Moses
LA Department of Wildlife and Fisheries
rmoses@wlf.la.gov
www.wlf.louisiana.gov
P.O. Box 98000
Baton Rouge, LA 70898 - 9000
225.765.2331 Ext. 1301

From: Jason Duet (WLF)
Sent: Wednesday, May 29, 2019 8:42 AM
To: Richard Moses <rmoses@wlf.la.gov>
Subject: FW: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Will you guys need assistance from data management on this?

From: Nicole Smith (WLF) <nsmith@wlf.la.gov>
Sent: Wednesday, May 29, 2019 8:17 AM
To: Jason Duet (WLF) <jduet@wlf.la.gov>
Subject: FW: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Since Froeba is out, I'm not sure you got this one. Might require Mike or Kevin to pull independent data. See below.

From: Richard Moses <rmoses@wlf.la.gov>
Sent: Tuesday, May 28, 2019 3:55 PM
To: Nicole Smith (WLF) <nsmith@wlf.la.gov>; Gary Vitrano <gvitrano@wlf.la.gov>; Bobby Reed <breed@wlf.la.gov>;

Brian Heimann <bheimann@wlf.la.gov>
Cc: Harry Blanchet <hblanchet@wlf.la.gov>; Raynie Harlan <RHarlan@wlf.la.gov>; Alexander Perret <aperret@wlf.la.gov>
Subject: FW: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

All

Please review the email chain below concerning a public records request (attached). It seems fairly straight forward and it seems this would only involve a couple of districts. The request is for copies but I assume electronic copies will work.

Harry I would think this could be completed within a couple of weeks. Once I have discussed with everyone I will try to get a more accurate time line.

Thanks
RDM

Richard Moses
LA Department of Wildlife and Fisheries
rmoses@wlf.la.gov
www.wlf.louisiana.gov
P.O. Box 98000
Baton Rouge, LA 70898 - 9000
225.765.2331 Ext. 1301

From: Harry Blanchet
Sent: Friday, May 24, 2019 8:53 AM
To: Richard Moses <rmoses@wlf.la.gov>
Cc: Deborah Marrs <DMarrs@wlf.la.gov>; Patrick Banks <pbanks@wlf.la.gov>; Jason Froeba <jfroeba@wlf.la.gov>
Subject: FW: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Ricky,
Please review this letter, work with the appropriate folk in Inland Fisheries and Data Management to obtain the requested data. Please let me know if you have any questions on this. Also, I will need to know how long it might take to compile this, so that Legal Section can advise the requestor of that.

Thanks,
Harry

From: Deborah Marrs <DMarrs@wlf.la.gov>
Sent: Friday, May 24, 2019 8:48 AM
To: Harry Blanchet <hblanchet@wlf.la.gov>
Cc: Patrick Banks <pbanks@wlf.la.gov>; Jason Froeba <jfroeba@wlf.la.gov>; Cole Garrett <cgarrett@wlf.la.gov>; Alvin F.

Landry <AFLandry@wlf.la.gov>
Subject: Public Records Request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting data related to the Gulf sturgeon in LA and the Alabama (inflated) Heelsplitter Mussel

Message sent on behalf of Cole Garrett, General Counsel, LDWF

Harry:

Please see the attached public records request from Lisa W. Jordan, Director, Tulane Environmental Law Clinic, requesting the following data:

1) Any and all information from 2016 to the present regarding the Gulf sturgeon in Louisiana, including, but not limited to, all monitoring, surveys, and abundance studies and any reports from such activity.

2) Any and all information regarding the Alabama (inflated) Heelsplitter Mussel, including, but not limited to, all monitoring, surveys and abundance studies and any reports from such activity.

Please provide responsive data to Debbie Marrs no later than Friday, June 28, 2019.

Thank you for your assistance in this matter.

Debbie Marrs
LA Department of Wildlife and Fisheries
Email address: dmarrs@wlf.la.gov
www.wlf.louisiana.gov
2000 Quail Drive (70808)
Mailing Address: P. O. Box 98000, Baton Rouge, LA 70898-9000
(o) 225-765-2971, Ext. 1436
(f) 225-763-3530

Mon_Id	PROJECT	SPECIAL	CSA	date	MONTH	DAY
353001	1	Bonnet Carre Spillway Monitoring	1	20190311	3	11

dur_method	LEN_INT	Length_Method
2 : Minutes	5	1 : Total Length (Millimeter)

Individual_Weight_Method

WATER	STATION	LATITUDE	LONGITUDE	YEAR
41002	1231	30.09956	-89.8172	2019

TIME	DUR	TAXA	Common_Name	Scientific_Name	GEAR
1443	10	1323	Gulf sturgeon	Acipenser oxyrinchus desotoi	101

Gear_Desc	SAMPNO	GROUP	Group_Count	WT_MEAS	T_NUM
16' flat otter trawl	.	106	1	.	1

Total_num_method	TOTAL_WEIGHT	Total_Weight_Method	len_meas
	.		532.5

EPA Region 6/FWS-Lafayette/LDEQ Conference Call: Eastern LMRAP (eLMRAP) DO Criteria

May 15, 2019

Attendees: Mike Schaub (EPA), Russell Nelson (EPA), Amy Trahan (FWS), Monica Sikes (FWS), Amanda Vincent (LDEQ), Jonathan McFarland (LDEQ)

Call Summary Outline

- EPA R6 introduced topic of discussion
    - Feb. 2019 Court Order vacated EPA's 2016 approval of LDEQ's seasonal criteria revision (2.3mg/L; applicable March-November) for subsegments in eLMRAP; previously applicable criteria (4mg/L estuarine; 5mg/L freshwaters) now apply.
    - EPA must approve/disapprove LDEQ's previously proposed revision, or state may choose to propose new criterion; approval will require informal and/or formal consultation with FWS.
    - LDEQ indicated that it intends to proceed with the previously approved seasonal criterion.

- FWS indicated that new seasonal DO criterion (2.3mg/L) is too low for protection of any freshwater mussel species.
    - Alabama study (Jeff Powell) indicated that DO levels below 4mg/L may not be adequate for fish species that serve as hosts for molluscan larvae (glochidia).
    - Host species impacts may affect ability of glochidia to attach/drop off in favorable habitat or at favorable times (due to fish avoidance of low DO areas).
    - FWS referenced Tulane Environmental Law Center document, previously provided to EPA, as having information useful to EPA's analysis.
    - FWS will need evidence that:
        - DO criterion represents natural DO conditions that exist, or are better than those DO conditions that exist, in those portions of the Amite River where the heelsplitter currently resides (will require analysis of DO conditions in Amite River - data would need to be provided by LDEQ).
        - DO condition is adequately protective of critical life stages of the heelsplitter

- FWS referenced potential impacts to Gulf sturgeon based on impacts to benthic food sources (reference: previously completed Lake Pontchartrain biological evaluation).
    - Direct effects perhaps less important than prey base effects (?)

- FWS will evaluate the criterion (2.3mg/L) as a 'constant condition'
    - EPA indicated that this criterion was established as a minimum criterion, not a long-term average condition
    - EPA/LDEQ will provide additional information regarding derivation of criterion and how it is applied.

- Follow-up:
    - FWS will provide to EPA additional references cited during meeting
    - EPA will provide original criteria revision proposal (UAA) to FWS
    - FWS will schedule call with EPA to meet with FWS mussel expert (Jennifer) in near future
    - EPA and LDEQ staff will discuss issue further and schedule follow-up call(s) with FWS

AFFIDAVIT OF KIMBERLY TERRELL, Ph.D.

BEFORE ME, the undersigned authority, personally came and appeared, Kimberly Terrell, Ph.D., who, after being duly sworn, did depose and say:

Qualifications

1) My name is Kimberly Terrell. I am a conservation scientist by training with over a decade of research experience, including in wildlife physiology and environmental science.

2) I am the Director of Community Outreach at the Tulane Environmental Law Clinic and serve as a staff scientist.

3) An accurate copy of my curriculum vitae is attached to this Statement.

4) I have reviewed and assessed the following documents related to dissolved oxygen impacts on sturgeon (*Acipenser spp.*) and freshwater mussels (*Unionida spp.*):

Hua and Neves. (2011) Captive Survival and Pearl Culture Potential of the Pink Heelsplitter Potamilus alatus. *North American Journal of Aquaculture*; 69: 147-158.

Johnson, P. M., A. E. Liner, S. W. Golladay, W. K. Michener, J. B. Box, and M. Freeman. (2001) Effects of drought on freshwater mussels and instream habitat in Coastal Plain tributaries of the Flint River, southwest Georgia. Final Report to the Nature Conservancy, Apalachicola River and Bay Project, Florida.

Kishini, S., Tchounwou, P.B., Farah I.O., and P. Chigbu. (2006) Recreational water quality control in Mississippi, USA: bacteriological assessment in the Pearl River and Ross Barnett reservoir. *Rev Environ Health*; 21: 295-307.

Kramer, D.L., Manley, D., and R. Bourgeois. (1983) The effect of respiratory mode and oxygen concentration on the risk of aerial predation in fishes. *Canadian Journal of Zoology*; 61: 653-665.

Roe, K.J., Simons, A.M., and Hartfield, P. (1997) Identification of a Fish Host of the Inflated Heelsplitter Potamilus inflatus (Bivalvia: Unionidae) with a Description of Its Glochidium. The American Midland Naturalist, 138: 48-54.

Rutherford, D.A., Gelwicks, K.R. and Kelso, W.E. (2011), Physicochemical Effects of the Flood Pulse on Fishes in the Atchafalaya River Basin, Louisiana. Transactions of the American Fisheries Society, 130: 276-288.

Secor, D.H. and T.E. Gunderson. (1998) Effects of hypoxia and temperature on survival, growth, and respiration of juvenile Atlantic sturgeon, *Acipenser oxyrinchus*. *Fishery Bulletin*; 96: 603-613.

Stern, E. M. (1976). The Freshwater Mussels (Unionidae) of the Lake Maurepas - Pontchartrain-Borgne Drainage System, Louisiana and Mississippi. LSU Historical Dissertations and Theses.2944.; available at http://digitalcommons.lsu.edu/gradschool_disstheses/2944

U.S. Geological Survey. (2019) USGS Current Conditions for the Nation, Station USGS 02488000 Pearl River at Rockport, MS. https://nwis.waterdata.usgs.gov/nwis/uv?. 2018-2019 data, accessed 13 Dec 2019.

5) This statement contains my expert opinions, which I hold to a reasonable degree of scientific certainty. My opinions are based on my application of professional judgment and expertise to available facts or data, consisting specifically of a review of scientific studies (4, above). These are facts and data typically and reasonably relied upon by an expert in this field.

6) In my expert opinion and for the reasons described below, adoption of minimum acceptable dissolved oxygen (DO) criterion of 2.3 mg/L during March through November in place of 5.0 mg/L (or 4.0 mg/L for estuarine waters) for the Eastern Lower Mississippi River Alluvial Plains (LMRAP) Ecoregion is not science-based and will not sufficiently protect all aquatic life from low oxygen-related stress, disease, reproductive failure and/or death.

Basis of Opinions

1. Although the oxygen tolerance of the Alabama heelsplitter (known scientifically as *Potamilus inflatus*) has not been studied,[1] the best available scientific evidence strongly suggests that a dissolved oxygen level of 2.3 mg/L would negatively affect wild populations of this species.

    a. It is well established that most freshwater mussel species are sensitive to low levels of dissolved oxygen (DO).[2] In a review of 124 published studies, the most common reason for the decline of freshwater mussels was water quality (and DO is generally considered an aspect of water quality).[3] While there are no published studies about the DO tolerance of the Alabama heelsplitter, other mussel species in the same family (Unionidae) are known to experience **high mortality when DO levels fall below 5 mg/L** in natural streams.[4] As Johnson et al. (2001) noted, "Despite adaptations to a wide range of environmental conditions… most mussels are considered sensitive to pollution, intolerant of extreme disturbance, and unable to withstand low DO…"

    b. In a survey of mussels in the Lake Pontchartrain basin, the Alabama heelsplitter (then known as *Proptera inflata*) was only found in locations where dissolved oxygen levels were above 6.0 mg/L.[5]

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[1]A literature search on the Web of Science on Jan 30, 2020 yielded no studies of the oxygen tolerance of the Alabama heelsplitter (using keywords "dissolved oxygen" or "DO" and any of the various names of this species: "Alabama heelsplitter" or "inflated heelsplitter" or "Potamilus inflatus" or "Proptera inflata").

[2]See, for example, Gillis et al, 2017; Downing et al., 2010; Hua and Neves, 2007; Johnson et al., 2001; and Sparks and Strayer (1998).

[3]Downing et al., 2010.

[4]Johnson et al., 2010.

[5] Stern (1976).

c. Like other freshwater mussels, the Alabama heelsplitter requires a fish host for successful reproduction. The only known host for the Alabama heelsplitter is the freshwater drum (*Aplodinotus grunniens*).[6] In Louisiana, the occurrence of the freshwater drum is strongly associated with dissolved oxygen (meaning that this host fish is less likely to occur in streams with low DO levels).[7]

2. Although the oxygen tolerance of the Gulf sturgeon (known scientifically as *Acipenser oxyrhynchus desotoi*) has not been studied,[8] the best available scientific evidence strongly suggests that a dissolved oxygen level of 2.3 mg/L would negatively affect wild populations of this subspecies.

   a. Juvenile Atlantic sturgeon experienced **94% mortality** when experimentally exposed to low DO levels (3.0 – 4.4 mg/L) at summer water temperatures.[9,10] Because Gulf sturgeon and Atlantic sturgeon are very closely related (i.e. they are two subspecies that belong to the same species, *Acipenser oxyrinchus*), they can be expected to demonstrate similar oxygen tolerances. In other words, evidence in Atlantic sturgeon indicates that DO levels at or below 4.4 mg/L are likely to cause mortality in the Gulf sturgeon.[11]

   b. Although wild populations of sturgeon may be able to access higher dissolved oxygen levels near the water surface, spending more time near the surface would reduce feeding opportunities (sturgeon are bottom-feeders) and increase risk of predation.[12]

3. In conjunction with my review of EPA's Biological Evaluation, I communicated with the authors of some of the studies on which EPA relied to confirm that EPA had misinterpreted or misapplied the authors' research findings. True and correct copies of those correspondences are attached to my affidavit as Attachments B-C.

Kimberly Terrell

SWORN TO AND SUBSCRIBED
BEFORE ME, THIS 4TH DAY
OF FEBRUARY, 2020.

LISA W. JORDAN
Notary Public
State of Louisiana
Orleans Parish
Bar Roll # 20451
My Commission is for Life

[6] Roe et al., 1997.
[7] Rutherford et al., 2011.
[8] A literature search on the Web of Science on Jan 30, 2020 yielded no studies of the oxygen tolerance of the Gulf sturgeon (using keywords "dissolved oxygen" or "DO" and "Gulf sturgeon" or "Acipenser oxyrhynchus desotoi").
[9] Secor and Gunderson, 1998.
[10] Fish were maintained at 79°F (26°C), a temperature representative of natural conditions in the Gulf sturgeon's Louisiana habitat. See Kishinhi et al. (2006) and 2018-2019 USGS temperature monitoring data from Rockport, MS (USGS Station # 02488000).
[11] https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=553269#null
[12] Kramer et al., 1983.

PHONE 504.235.6328 • E-MAIL KTERRELL1@TULANE.EDU

KIMBERLY TERRELL

EDUCATION

University of New Orleans, 2011
Ph.D., Conservation Biology

Tulane University, 2005
B.A., Political Science
B.S., Cell & Molecular Biology

AFFILIATIONS & MEMBERSHIPS

Adjunct Professor
2018 – Present
Louisiana State University, School of Renewable Natural Resources; Baton Rouge, LA

Adjunct Professor
2015 – Present
University of Memphis, Biology Department; Memphis, TN

Research Associate
2013 – 2018
Smithsonian Conservation Biology Institute; Washington, DC & Front Royal, VA

Member, National Association for the Advancement of Colored People

Lifetime Member, Society for Conservation Biology

Lifetime Member, Society for the Study of Amphibians and Reptiles

GRANTS, CONTRACTS & AWARDS

2018 Smithsonian Institution contract for biodiversity surveys, $25,000 *declined*

2018 NFWF subcontract for environmental sampling, $10,000

2016 USFWS Wildlife Health Grant, $15,700

BIOSKETCH

Dr. Kimberly Terrell is the Director of Community Outreach at Tulane University's Environmental Law Clinic and maintains academic affiliations with the School of Renewable Natural Resources at Louisiana State University and the Department of Biology at the University of Memphis. Prior to joining Tulane, Dr. Terrell worked as a conservation biologist, studying the effects of environmental change on native U.S. wildlife. She has >10 years of experience in conservation research, community outreach, project management, and grant-writing. In her current position, Dr. Terrell works to help concerned citizens gain access to legal resources and have a voice in the environmental decisions that affect their communities.

POSITIONS HELD

Director of Community Outreach (Oct 2018 – present)
Tulane University's Environmental Law Clinic; New Orleans, LA
Manage relationships between clients, potential clients, and clinic staff. Develop training materials, research environmental issues, help determine client needs and develop strategies. Manage collaborative projects, facilitate media relations, and secure grant funding. Supervise students, interns, and volunteers.

Independent Contract Biologist (Dec 2017 – Oct 2018)
New Orleans, LA
Designed and conducted scientifically-rigorous studies to benefit wildlife conservation and natural resource management in southeast Louisiana. Promote STEM education and conservation outreach. Provide technical advice to natural resource managers about habitat conservation issues.

Director of Research and Conservation (Aug 2015 – Nov 2017)
Memphis Zoo; Memphis, TN
Led research projects focused on wildlife conservation in zoos and in nature. Supervised 5 full-time staff and managed an annual budget of $1.5 million. Managed internal grants program, including reviewing proposals and evaluating projects. Provided technical advice to senior management on ecological restoration and habitat conservation issues.

Independent Contract Biologist (Oct 2013 – July 2015)
New Orleans, LA
Designed and conducted research to establish species inventories of amphibians and reptiles in southeast Louisiana National Wildlife Refuges (Bayou Sauvage, Big Branch Marsh, and Bogue Chitto) for US Fish and Wildlife Service (USFWS). Trained and supervised field staff, analyzed data, conducted STEM outreach, and prepared reports.

David H. Smith Post-Doctoral Research Fellow (Sep 2011 – Oct 2013)
Smithsonian Conservation Biology Institute (Washington, DC)
Designed and conducted research to understand the effects of climate change on amphibian physiology and disease susceptibility. Engaged local communities in amphibian conservation and science education.

GRANTS, CONTRACTS & AWARDS

2016 US Forest Service grant for wildlife conservation, $272,000

2015 USFWS contract for native wildlife surveys, $60,000

2014 Maryland DNR contract for wildlife disease research, $14,000

2014 NAFWA RCN Grant for environmental research, $100,000

2013 Virginia State Wildlife Grant for research, $60,000

2011 – 2013, David H. Smith Conservation Research Fellowship, $170,000

2012 Friends of the National Zoo Ambassador Grant, $45,000

2012 Virginia State Wildlife Grant for education, $18,000

2010 – 2011, Smithsonian Predoctoral Fellowship, $28,450

2007 – 2010, National Science Foundation Graduate Research Fellowship, $121,500

2005, Tulane Environmental Stewardship Award

ADDITIONAL TRAINING & CERTIFICATIONS

Advanced SCUBA, Dive Rescue and NITROX, American Academy of Underwater Sciences

Beginner and Intermediate ArcGIS, July 2013 and 2014

Advanced Statistical Analyses in R Workshop, May 2013

Popular Writing for Conservation Workshop, Jan 2013

Media Communications and Policy Workshop, Jan 2012

Conservation Business and Leadership, Aug 2011 & 2012

POSITIONS HELD (*continued*)

Smithsonian Pre-Doctoral Research Fellow (Sep 2010 – Aug 2011)
Smithsonian Conservation Biology Institute (Front Royal, VA)
Designed and conducted research related to physiology of endangered felid species. Conducted science education and conservation outreach. Secured research funding, engaged media to promote conservation.

NSF Graduate Research Fellow (Aug 2007 – Aug 2010)
University of New Orleans/Smithsonian Conservation Biology Institute
Designed and conducted research related to physiology of endangered felid species. Conducted science education and conservation outreach.

Teaching Assistant (Aug 2006 – July 2007)
University of New Orleans
Conducted research and taught introductory biology laboratory courses.

SELECTED RESEARCH EXPERIENCE

July 2016 – 2018 Orleans Parish, LA

Identifying Causes of Wildlife Die-Offs in Bayou Sauvage NWR

Conducting collaborative, field and lab-based physiological research to elucidate the causes of ongoing snake mortality in the refuge. Research includes GIS mapping, environmental exposures, GC-MS sediment analysis, water quality monitoring, and biological sampling.

Aug 2013 – 2018 Northeastern U.S. (NY, PA, MD, VA, WV)

Cataloging Freshwater Biodiversity from Environmental DNA

Coordinating a 5-state project to map the distribution of *Cryptobrancus alleganiensis* salamanders through eDNA surveys, in partnership with state wildlife agencies, universities, non-profits, and citizen science groups.

Jan 2015 – Apr 2016 Southeastern Louisiana

Inventorying Louisiana's Amphibian and Reptile Communities

Designed and coordinated broad-scale surveys of herpetological communities in the southeast Louisiana National Wildlife Refuge system, in partnership with Daniel Breaux and Shelley Stiaes (USFWS). Established the first comprehensive amphibian and reptile species inventories for southeast LA refuges.

Feb 2013 – Mar 2016 National Zoo (DC)

Investigating Chytridiomycosis in Frogs and Salamanders

Investigated immune function in lowland leopard frogs (*Lithobates yavapaiensis*) experimentally infected with *Batrachochytrium dendrobatidis* (*Bd*). Surveyed for *Bd* and *B. salamandrivorans* in *C. a. alleganiensis*.

Oct 2013 – June 2014 Mid-Atlantic U.S.

Distribution and Prevalence of Ranavirus in Wood Frogs

Partnered with MD, VA, NJ, DE, and PA wildlife agencies to investigate the prevalence and impacts of ranavirus in (*L. sylvatica*) through population monitoring and biological sampling.

MEDIA PRESENCE

Darling, E., **K.A. Terrell**, E. Bayraktarov. "Imperiled Treasure: A Coral Reef Called Varadero". 6 Oct 2017 news.mongabay.com

Calatayud, N. and **K.A. Terrell**. "In Search of an Iconic Salamander". 24 Aug 2017 sandiegozoo.org/science-blog

Main, D. "Effect of Fracking is Basically Unknown". 1 Aug 2014 *Popular Science*

Landau, Lauren. "Searching for Salamanders in Appalachia." *WAMU 88.5* 25 April 2014.

Lee, Jane. "U.S. Giant Salamanders Are Slipping Away: Inside the Fight to Save the Hellbender." *National Geographic* (film interview), 19 Dec 2013.

Jacobson, Rebecca. "Rustling River Monsters for Science." *PBS Newshour* 7 Aug 2013.

Springston, Rex. "Salamanders' Disappearance Raises Pollution Concerns." *Richmond Times-Dispatch* 17 Jun 2013.

PROFESSIONAL SERVICE

2015 – 2018 *Ad hoc* reviewer for:

- EcoHealth
- Scientific Reports
- Conservation Physiology
- Theriogenology
- PLoS One
- Journal of Integrative & Comparative Biology
- Journal of Herpetology

2013-2018 David H. Smith Postdoctoral Fellowship Application reviewer

2016-2017 Society for Conservation Biology meeting abstract reviewer

SELECTED PUBLICATIONS

Terrell, K.A., et al. Multi-Source Contamination and Unusual Wildlife Mortality in a Federally-Protected Urban Refuge. Ecol Evol. *In Review*.

Weber, B., K.E. Bowers, **K.A. Terrell**, et al. Pre- and post-natal effects of maternal corticosterone on growth, stress reactivity, and survival of nestling house wrens. Funct Ecol. *In Press*.

Terrell, K.A. To Nature, With Love: Sending Mississippi Gopher Frogs Back to the Wild. *Exzooberance*, Memphis Zoo, Jul/Aug 2017

Savage, A., **K.A. Terrell**, et al. Reduced immune function predicts disease susceptibility in frogs infected with a deadly fungal pathogen. Cons Phys 2016; doi: 10.1093/conphys/cow011.

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SELECTED EDUCATION AND OUTREACH

Oct 2007 – Mar 2018 Lafayette Parish Schools (LA)
Gaining Early Awareness & Readiness for Undergraduate Programs
Conducted hands-on science classes with ~2,500 students from underperforming schools serving low-income communities.

Feb 2017 & Sep 2017 Memphis, TN
Taste of Science™ Memphis
Invited guest speaker for this public event aimed at promoting science literacy among adults.

Feb 2017 Shelby County Schools (Memphis, TN)
District Learning Day
Developed and presented a curriculum focused on climate change science and incorporating NGS Standards for 30 educators.

May 2015 De La Salle High School (New Orleans, LA)
Exploring Native Amphibian and Reptile Diversity
Gave a guest lecture about local biodiversity to AP Biology Students and organized a follow-up field trip to Big Branch Marsh.

Terrell, Kimberly A

From: Justus, Billy <bjustus@usgs.gov>
Sent: Thursday, April 4, 2019 2:53 PM
To: Terrell, Kimberly A
Cc: Scott Mize; Daniel Kroes
Subject: Re: [EXTERNAL] DO criterion for eastern LMRAP

Hi Kim:

I have had some correspondence with Dan and Scott and we hope this helps provide clarification. If we understand correctly, distributions for the three T&E species (Gulf sturgeon, pallid sturgeon, and Alabama heelsplitter) are limited primarily to areas east of the Mississippi River. Our dissolved oxygen study, however, was conducted in streams that are west of the Mississippi River which are in different level four ecoregions and, in two of three cases, are smaller streams than what the three T&E species in question generally inhabit. We have at different times, however, worked in streams on both sides of the Mississippi River and agree that stream habitats on the east and west sides can be quite different. All the above being considered, it is quite possible that our dissolved oxygen determinations for streams on the west side of the Mississippi would not be applicable to streams on the east side of the Mississippi River.

Best regards.

Billy

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The ability to consider new information is key to our perceptions and eventual assessments. No amount of intelligence will offset faulty reasoning and subjectivity.
<o))))>< <o))))>< <o))))>< <o))))><

Billy Justus, Research Aquatic Biologist
U.S. Geological Survey
Lower Mississippi-Gulf Water Science Center
401 Hardin Rd, Little Rock, AR 72211
office (501) 228-3626
work cell (501) 425-7896

On Thu, Apr 4, 2019 at 10:34 AM Terrell, Kimberly A <kterrell1@tulane.edu> wrote:

> Dear Billy,
>
> I'm reaching out to seek your perspective on EPA's revised dissolved oxygen criteria for the Eastern Lower Mississippi River Alluvial Plains Ecoregion. As you may be aware, the new standard would set a minimum criterion of 2.3 mg/L for inland streams (including 6 estuarine segments) from March-Nov in the eastern LMRAP.
>
> Your perspective is particularly important because, in the attached Biological Evaluation of corresponding impacts to T&E species (Gulf sturgeon, pallid sturgeon, and Alabama heelsplitter), EPA states that "The proposed criteria revisions are also supported by the findings of Justus et al. (2012) in which fish community changes were observed at a DO concentration of 2.3 mg/L." (See page 14 in the attached. Your study is referenced again on pages 33 & 34. I believe the pub year is actually 2014.)

Do you agree with the above statement from EPA? Either way, would you be willing to give me your perspective on it? It's off the record, though if you disagreed with the Biological Evaluation, I would ask you to consider providing input in a more formal way.

FYI - my background is in conservation biology and herpetology, and I'm the Community Outreach Director for the Tulane Environmental Law Clinic. Healthy Gulf (formerly Gulf Restoration Network) and other local groups have requested our assistance on this issue. As a scientist, I understand that water quality standards developed for upland streams may not be appropriate for lowland streams. However, I also feel that there are some key considerations missing from the attached Biological Evaluation. I'm curious to hear your perspective. I've spoken with Dan Kroes, and am also planning to reach out to Scott Mize, Bill Kelso, and Michael Kaller. Please let me know if you know of any other folks that might want to weigh in on this issue.

Thanks for any insight you can provide.

Warmly,

Kim

Kimberly Terrell, Ph.D.

Director of Community Outreach

Tulane Environmental Law Clinic

6329 Freret Street

New Orleans, LA 70118

504-865-5787 (office)

504-235-6328 (cell)

Terrell, Kimberly A

From: Don Campton <Don_Campton@fws.gov>
Sent: Wednesday, April 17, 2019 5:13 PM
To: Terrell, Kimberly A
Cc: bbowen@hawaii.edu; fchapman@ufl.edu; abass@une.edu
Subject: RE: Biological Evaluation for Gulf and pallid sturgeon
Attachments: Campton et al 2000 Cons_Gen.pdf

Kimberly,

Thank you for your email inquiry below and bringing the subject issue to my attention and to the attentions of my three coauthors. I have highlighted relevant passages in your email below and responded to each of them here:

1. EPA conducted a Biological Evaluation (attached) of the potential impacts to Gulf sturgeon, pallid sturgeon, and the inflated heelsplitter. Your perspective is important because they cite your study as evidence that Gulf and pallid sturgeon are adapted to hypoxic conditions …
   Comment: Our study (Campton et al. 2000; see attached) did not address the physiology of pallid sturgeon (or Gulf sturgeon) nor did it report any data regarding physiologic adaptations of pallid sturgeon. Our published study (Campton et al. 2000) did not include Gulf sturgeon. Our paper presented only mitochondrial DNA (mtDNA) data for the following three species: pallid sturgeon, shovelnose sturgeon, and Alabama sturgeon.

2. Page 21: "There are indications that the northern and southern Pallid sturgeon arose independently from different ancestors and are not a monophyletic lineage, thereby representing two separate species (Campton et al. 2000).
   Comment: In our study (Campton et al. 2000), we offered three alternative hypotheses to explain phylogeographic patterns of mtDNA variation within and among populations (localities) of pallid and shovelnose sturgeon. We were unable to reject any of the three hypotheses with the data we presented, including the hypothesis of a monophyletic origin for pallid sturgeon followed by secondary contact and subsequent interbreeding (aka hybridization) with shovelnose sturgeon. Moreover, levels of sequence divergence observed among all mtDNA haplotypes, including those observed (a) between pallid and shovelnose sturgeon and (b) between localities (populations) for each taxon, were more consistent with levels of sequence divergence typically observed among conspecific populations than among congeneric species.

3. **This suggests that Pallid sturgeon may have similar genetic adaptations to hypoxia** and higher temperature typical of the black water environments that are found in the action area.

Comment: As noted in Comment #1 above, our study (Campton et al. 2000) did not present any physiologic data; hence, we did not present any conclusions or interpretations regarding "genetic adaptations to hypoxia".

4. …, there are indications that the northern and southern Pallid sturgeon arose independently from different ancestors and **represent two separate species** (Campton et al. 2000).
   Comment: See Comment #2 above, especially the last sentence of that comment.

5. **genetic differences in those [pallid sturgeon] in the southern geographical range providing a greater ability to shift its metabolism in anaerobic conditions.**
   Comment: See Comments #1 and #3 above.

I have not reviewed the EPA document (dated October 5, 2017) which was included with your email inquiry. Hence, I do not have any direct comments on that document at this time.

Thanks again for your inquiry.

Sincerely,
Don Campton

Don Campton
Science Advisor / Fish Biologist
Fish and Aquatic Conservation
U.S. Fish & Wildlife Service
911 N.E. 11th Avenue
Portland, Oregon 97232

Office: 503-231-2386
Cell: 503-784-0564
FAX: 503-231-2062

From: Terrell, Kimberly A <kterrell1@tulane.edu>
Sent: Wednesday, April 10, 2019 3:51 PM
To: don_campton@fws.gov; bbowen@hawaii.edu; fchapman@ufl.edu; abass@une.edu
Subject: [EXTERNAL] Biological Evaluation for Gulf and pallid sturgeon

Dear Don, Anna, Frank, and Brian,

I'm reaching out to get your thoughts on EPA's interpretation of your Campton et al. (2000) study of sturgeon genetics. Louisiana DEQ has proposed to reduce dissolved oxygen criteria to 2.3 mg/L for freshwater and estuarine stream segments in the eastern Lower Mississippi River Alluvial Plains ecoregion, which includes sturgeon habitat. EPA conducted a Biological Evaluation (attached) of the potential impacts to Gulf sturgeon, pallid sturgeon, and the inflated heelsplitter. Your perspective is important because they cite your study as evidence that Gulf and pallid sturgeon are adapted to hypoxic conditions and thus are unlikely to be harmed by the lowered standard. I've copied and pasted the relevant sections of the Biological Evaluation below.

FYI – I direct the Community Outreach program at Tulane Environmental Law Clinic and serve as a staff biologist. Our clinic is representing Healthy Gulf and other local environmental groups in opposition to the reduced DO criterion. I'm reaching out to biologists whose work was cited by EPA in this evaluation. If you believe your research was misinterpreted by EPA in this context, I'd ask you to consider providing formal input. But at this stage, I'm just asking for candid, off-the-record feedback.

From the Biological Evaluation

Page 21: "There are indications that the northern and southern Pallid sturgeon arose independently from different ancestors and are not a monophyletic lineage, thereby representing two separate species (Campton et al. 2000). These data (Campton et al. 2000, Tranah et al. 2001, Heist and Schrey 2006a) suggest that the genetic structuring within the Pallid sturgeon's range represents two distinct groups at the extremes of the species range with a middle intermediate group representing the lower Missouri and middle Mississippi Rivers. This pattern is suggestive of a pattern of isolation by distance, with gene flow more likely to occur between adjacent groups than among geographically distant groups resulting in greater genetic differences as geographical distance between groups increases."

Page 33: "Campton et al. (2000) used mitochondrial DNA to examine genetic variation within and among three Pallid Sturgeon groups; two from the upper Missouri River and one from the Atchafalaya River. Although the Pallid Sturgeon from the upper Missouri River and Atchafalaya Rivers did not share any haplotypes, the genetic distance between these two groups (0.14%) was nearly as great as the genetic distance between Pallid and Shovelnose sturgeon in the upper Missouri River (0.15%). The authors note that this may represent reproductive isolation and genetic divergence between these two populations of Pallid sturgeon that is nearly as old as the isolation between Pallid and Shovelnose sturgeon. **This suggests that Pallid sturgeon may have similar genetic adaptations to hypoxia** and higher temperature typical of the black water environments that are found in the action area. Given the genetic variation separating the Atlantic sturgeon from the Gulf subspecies, **it is likely that the Gulf sturgeon has a similar genetic adaption** to black water environments that characterize the action area. (USFWS 2009)." (emphasis added)

Pages 39-40: "The cited literature suggests that like the Gulf sturgeon, the diverse habitats of the Pallid sturgeon have likely lead to significant genetic variation. As noted in the species description, there are indications that the northern and southern Pallid sturgeon arose independently from different ancestors and **represent two separate species** (Campton et al. 2000), These data (Campton et al. 2000, Tranah et al. 2001, Heist and Schrey 2006a) suggest that the genetic structuring within the Pallid sturgeon's range represents two distinct groups at the extremes of the species range. This pattern is suggestive of a pattern of isolation by distance, with gene flow more likely to occur between adjacent groups, and thus, **genetic differences in those in the southern geographical range providing a greater ability to shift its metabolism in anaerobic conditions.** In addition to these metabolic adaptations, Pallid sturgeon also exhibit behavioral responses to DO stress common to any fish species."

Note that the Biological Evaluation doesn't actually contain the full reference for your study, but I'm assuming it's *Genetic distinction of pallid, shovelnose, and Alabama sturgeon: emerging species and the US Endangered Species Act*.

Looking forward to hearing your thoughts. Feel free to call if you prefer to chat by phone.

Warmly,

Kim

Kimberly Terrell, Ph.D.
Director of Community Outreach
Tulane Environmental Law Clinic
6329 Freret Street
New Orleans, LA 70118
504-865-5787 (office)

504-235-6328 (cell)

Exhibit F

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

May 18, 2016

Mr. Elliot B. Vega
Assistant Secretary
Office of Environmental Services
Louisiana Dept. of Environmental Quality
Post Office Box 4313
Baton Rouge, Louisiana 70821-4313

Dear Mr. Vega:

Please reference our March 22, 1996, Memorandum of Understanding (MOU) with the Louisiana Department of Environmental Quality (LDEQ) regarding federally listed threatened and endangered species, and the Louisiana Pollutant Discharge Elimination System (LPDES) program. In accordance with the terms of that MOU, the Fish and Wildlife Service (Service) is pleased to provide LDEQ with the enclosed current list of sensitive areas (i.e., waters deemed important for the conservation of threatened and endangered species). In September 1996, our agencies developed an implementation strategy for the Scope-of-Work section of the subject MOU. That strategy (which has been updated annually since 1997) included a list of sensitive areas, types of permits, notices of intent, substances of concern, and listed species for which the Service has requested coordination, in accordance with provisions of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

As we have done in the past, the Service intends to continue that implementation strategy (enclosed) for this federal fiscal year (October 2015 through September 2016). We have also reviewed the revised subsegment boundaries LDEQ provided us on March 21, 2016. We have also enclosed some specific species information that should provide additional guidance in determining whether LDEQ should coordinate with the Service for certain permitted discharges to the listed sensitive waterbodies. In addition, please take note of the inclusion of selenium in the list of substances of interest in Section II.2.1.

The Service appreciates the continuing cooperation of LDEQ in the conservation of federally listed species. If you or your staff have any comments or require further information, please have them contact Ms. Amy Trahan (337/291-3126) of this office.

Sincerely,

Darryl Clark
Acting Field Supervisor
Louisiana Ecological Services Office

Enclosures

cc: Mr. Matt Hubner, EPA, 6WQ-EW, Dallas, TX
Mr. Scott Guilliams, LDEQ-WQAD, Baton Rouge, LA
Mr. Bruce Fielding, LDEQ, Baton Rouge, LA
Ms. Heather Babin, LDEQ, Baton Rouge, LA
Ms. Steph Braden, LDEQ, Baton Rouge, LA
LDWF, Natural Heritage Program, Baton Rouge, LA

2015-2016 Implementation Strategy for the Louisiana Department of Environmental Quality and the U.S. Fish and Wildlife Service Memorandum of Understanding

Section II. Scope of Work

Section II.1 LDEQ and the Service will follow the procedures described in the MOU. The Service, by November 1, 2016, will provide LDEQ a list of all federally listed threatened and endangered species in Louisiana that are dependant on aquatic habitat.

SPECIES	HYDROLOGIC SUBSEGMENTS
Alabama (= inflated) heelsplitter mussel	040101, 040103, 040302
Fat pocketbook mussel	070101, 070201
Atlantic sturgeon, critical habitat*	040102, 040103, 040301, 040302, 040303, 040304, 040305, 040401, 040402, 040501-040503, 040505, 040601, 040602, 040604, 040701-040704, 040801-040804, 040901, 040902, 040904, 040905, 040906, 040908, 040910, 040911, 041001, 041002, 041301, 041302, 041401, 041701, 041702, 041703, 041704, 041901, 042001-042004, 042201, 042202, 042203-042206, 042207, 042209, 070601, 090101-090107, 090201-090208, 090301, 090401, 090501, 090506 ***See Addendum for additional information.**
Louisiana pearlshell mussel	060208, 060209,101301, 101302
Louisiana quillwort	040804, 040904, 090501, 090506
Pallid sturgeon	010101, 010201, 010501, 010502, 010801-010803, 070101, 070103, 070201, 070301, 070502, 100101, 100201
Pink mucket pearly mussel	080101, 080401, 080701

Rabbitsfoot mussel	080101, 080401, 080701
Ringed map (= sawback) turtle	090101-090106 (excluding 090104), 090201-090207, 090501, 090502
West Indian manatee	040302, 040401, 040403, 040501, 040502, 040503, 040601, 040602, 040702, 040902, 040904, 040906, 040908, 040911, 041001, 041002, 041701, 041703, 041704, 042001, 042101, 042202

Section II.2 LDEQ and the Service will follow the procedures described in the MOU <u>except</u> that the Service will only request coordination on those permits that fall into one or more of the following seven categories:

1. The proposed permit occurs in a subset of sensitive waters defined as those subsegments where the following species occur, and the regulated discharge contains one or more of the substances listed below:

SPECIES	HYDROLOGIC SUBSEGMENTS
Alabama (= inflated) heelsplitter mussel	040101, 040103, 040302
Fat pocketbook mussel	070101, 070201
Atlantic sturgeon, critical habitat*	040102, 040103, 040301, 040302, 040303, 040304, 040305, 040401, 040402, 040501-040503, 040505, 040601, 040602, 040604, 040701-040704, 040801-040804, 040901, 040902, 040904, 040905, 040906, 040908, 040910, 040911, 041001, 041002, 041301, 041302, 041401, 041701, 041702, 041703, 041704, 041901, 042001-042004, 042201, 042202, 042203-042206, 042207, 042209, 070601, 090101-090107, 090201-090208, 090301, 090401, 090501, 090506 ***See Addendum for additional information.**
Louisiana pearlshell mussel	060208, 060209,101301, 101302

Louisiana quillwort	040804, 040904, 090501, 090506
Pallid sturgeon	010101, 010201, 010501, 010502, 010801-010803, 070101, 070103, 070201, 070301, 070502, 100101, 100201
Pink mucket pearly mussel	080101, 080401, 080701
Rabbitsfoot mussel	080101, 080401, 080701
Ringed map (= sawback) turtle	090101-090107 (excluding 090104), 090201-090206, 090501, 090502
West Indian manatee	040302, 040401, 040403, 040501, 040502, 040503, 040601, 040602, 040702, 040902, 040904, 040906, 040908, 040911, 041001, 041002, 041701, 041703, 041704, 042001, 042101, 042202

Substances

Endosulfan
Hexachlorobenzene
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)
Arsenic
Chromium III
Chromium VI
Zinc
Cadmium
Copper
Lead
Mercury
Nickel
Cyanide
Pentachlorophenol (PCP)
Selenium; or

2. The proposed permit is for a major (i.e., flow of one million gallons per day or more) sanitary sewage treatment facility (not covered under a General Permit for Class I, II, III, or IV Sanitary Dischargers), and is located in the sensitive areas described in Section II.2.1; or

3. The proposed permit is for a landfill (other than those covered under Construction/Demolition Debris and Woodwaste Landfill [LAG780000] and

Municipal Solid Waste Landfill [LAG660000] General Permits) and is located in the subset of sensitive areas described in Section II.2.1; or

4. The proposed permit is for a facility applying for coverage under the General Permit for Cement, Concrete, and Asphalt Facilities (LAG110000) and is located in the sensitive areas described in Section II.2.1; or

5. The proposed permit is for an electrical generating facility located in the sensitive areas described in Section II.2.1; or

6. The proposed permit is for a sand and gravel operation (including those applying for coverage under the General Permit for Sand and Gravel Extraction Facilities [LAG490000]) and is located in a subset of sensitive waters expected to support the Louisiana quillwort (subsegments 040804, 040904, 090501, 090506), the Alabama heelsplitter mussel, the Louisiana pearlshell mussel, the fat pocketbook mussel, the pink mucket pearly mussel, the rabbitsfoot mussel, the Atlantic sturgeon, the pallid sturgeon, or the ringed map turtle; or,

7. The proposed permit is for a facility utilizing a cooling water intake structure that is regulated under §316(b) of the Clean Water Act and is located in the sensitive areas described in Section II.2.1.

If a proposed permit falls into one or more of the above categories, the proposed discharge may affect a listed species and coordination should be initiated with the Service to: (1) determine if an adverse effect exists, and (2) explore ways to remove the effect.

Because hydrologic subsegments often cover large geographic areas, it is expected (for species with restricted distributions) that some proposed permits located in sensitive areas may not affect a species because the species is not actually present at that proposed discharge site. However, if an effect exists and that effect can be removed, a "not likely to adversely affect" determination will be made by LDEQ on the modified permit and submitted to the Service for concurrence. If no agreement can be reached between the Service and LDEQ, procedures for consulting with EPA as outlined in the MOU will be followed.

Based on LDEQ effluent limitations established for the protection of aquatic life and maintenance of the receiving waters as aquatic habitat, proposed permits not falling into those above-described categories are not likely to adversely affect listed species; therefore, no coordination with the Service is required. Similarly, no further coordination with the Service is required for any permits (individual or general) that would be renewed under the LPDES program for which the Service has already reviewed and provided concurrence, provided that those permits contain more stringent limitations and/or do not contain any changes/modifications in permit limitations.

Section II.3 LDEQ and the Service will follow the procedures described in the MOU. Based on effluent limitations established for the protection of aquatic life and maintenance of the receiving waters as aquatic habitat, the Service has determined that the following general permits are not likely to adversely affect listed species; and therefore, no coordination is required:

Automotive Facilities and/or Repair Shops (LAG470000)
C & D Landfills (LAG780000)
Concentrated Animal Feeding Operations (LAG010000)
Dewatering Petroleum Tanks (LAG300000)
Exterior Vehicle Wash Wastewater (LAG750000)
Hydrostatic Test Wastewater (LAG670000)
Light Commercial Facilities (LAG480000)
Multi-Sector General Stormwater (LAR050000)
Municipal Solid Waste Landfills (LAG660000)
Oil and Gas Activities (LAG330000)
Petroleum UST Systems Cleanup (LAG830000)
Potable Water Treatment Plants (LAG380000)
Sanitary Discharge Class I (LAG530000)
Sanitary Discharge Class II (LAG540000)
Sanitary Discharge Class III (LAG560000)
Sanitary Discharge Class IV (LAG570000)
Small Municipal Separate Storm Sewer Systems (LAR040000)
Storm Water for Construction Activities (LAR100000)
Storm Water for Small Construction Activities (LAR200000)
Treated Groundwater (LAG940000)
Vessel Cleaning and Repair and Shipyards (LAG030000)
Oil and Gas (Territorial Seas) (LAG260000)
Short Term General Permit (LAG420000)

Section II.4 LDEQ and the Service will follow the procedures outlined in this section. LDEQ will send a list of anticipated renewals for all permits falling in all sensitive areas as defined under Section II.1, and all other information as detailed in this section.

Section II.5 LDEQ and the Service will follow the procedures described in the MOU.

Addendum to Sections II.1 and II.2 of the Implementation Strategy for the Louisiana Department of Environmental Quality (LDEQ) and the U.S. Fish and Wildlife Service (Service) Memorandum of Understanding (MOU)

A. Species-specific information regarding the Gulf sturgeon:

The Atlantic sturgeon (*Acipenser oxyrhynchus desotoi*), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwannee River, Florida. In Louisiana, Atlantic sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Atlantic sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that designation. The primary constituent elements essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components; those elements should be considered when determining potential project impacts. The primary constituent elements for Atlantic sturgeon critical habitat include:

- abundant prey items within riverine habitats for larval and juvenile life stages, and within estuarine and marine habitats for juvenile, sub-adult, and adult life stages;

- riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay;

- riverine aggregation areas, also referred to as resting, holding and staging areas, used by adult, sub-adult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during freshwater residency and possibly for osmoregulatory functions;

- a flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) necessary for normal behavior, growth,

and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging; and necessary for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larvae staging;

- water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;

- sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

- safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., a river unobstructed by a permanent structure, or a dammed river that still allows for passage).

In that critical habitat designation, responsibility for consultation with specific Federal agencies was also identified for the Service and for the NMFS. For estuarine and marine waters in Louisiana, the NMFS is responsible for consultations regarding impacts to the sturgeon and its critical habitat with all Federal agencies, except the Department of Transportation, the Environmental Protection Agency, the U.S. Coast Guard, and the Federal Emergency Management Agency, which consult with the Service. Therefore, please contact Dr. Stephania Bolden (727/824-5312) in St. Petersburg, Florida, for information concerning that species and its critical habitat within marine waters.

B. Specific information regarding listed subsegments for the Atlantic sturgeon:

In an effort to provide more accurate information for the Atlantic sturgeon and their known locations and potential habitats than what is listed in Sections II.1 and II.2 of the MOU, the Service offers the following specific information for individual subsegments that are listed for the Atlantic sturgeon.

1. For the following subsegments, the Service requests review of those permits that would discharge into either the primary waterbody or its perennial primary tributaries:

   040301 – Amite River and perennial primary tributaries
   040302 – Amite River and perennial primary tributaries
   040303 – Amite River (Diversion Canal) and perennial primary tributaries
   040304 – Perennial primary tributaries of the Amite River
   040305 – Perennial primary tributaries of the Amite River
   040401 – Blind River and perennial primary tributaries
   040402 – Amite River Diversion Canal and perennial primary tributaries
   040501 – Tickfaw River and perennial primary tributaries
   040502 – Tickfaw River, Blood River, and perennial primary tributaries
   040503 – Natalbany River and perennial primary tributaries
   040505 – Ponchatoula Creek and River, and perennial primary tributaries

040701 – Tangipahoa River and perennial primary tributaries
040702 – Tangipahoa River and perennial primary tributaries
040801 – Tchefuncte River and perennial primary tributaries
040804 – Bogue Falaya River and perennial primary tributaries
040901 – Bayou Lacombe and perennial primary tributaries
040902 – Bayou Lacombe and perennial primary tributaries
040905 – Bayou Liberty and perennial primary tributaries
040906 – Bayou Liberty and perennial primary tributaries

2. For the following subsegments, the Service requests review of those permits that would discharge into the primary waterbody only:

040102 – Comite River only
040103 – Comite River only
040601 – Pass Manchac and North Pass only
040602 – Lake Maurepas only
040604 – Owl Bayou only
040703 – Big Creek and East Fork only
040704 – Chappepeela Creek (both branches) only
040803 – Tchefuncte River only
040904 – All primary streams only
040908 – Bayou Bonfouca only
041702 – Bayou Sauvage and Chef Menteur Pass only

3. For the following subsegments, the Service requests review of those permits that would discharge into any waterbody within the subsegment:

040802, 040910, 041001, 041002, 041701, 041703, 041704, 041901, 042001, 042003, 042201 – 042207, 042209, 070601, 090101 – 090107, 090201 – 090208, 090301, 090401, 090501, 090506