Center for Independent Experts (CIE) Independent Peer Review of ‘Predicting the effects of low salinity exposure associated with the Mid-Barataria Sediment Diversion project on resident common bottlenose dolphins (*Tursiops truncatus*) in Barataria Bay, LA.’

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The following report serves as a scientific, independent peer review of the following document:

> Garrison, LP, Litz, J, and Sinclair, C. 2020. Predicting the effects of low salinity associated with the MBSD project on resident common bottlenose dolphins (*Tursiops truncatus*) in Barataria Bay, LA. NOAA Technical Memorandum SEFSC-XXX, 85 pgs.

Executive Summary

Garrison et al. (2020) have developed a careful and comprehensive simulation modelling approach to explore how changes in salinity in Barataria Bay, LA, USA arising from the Mid-Barataria Sediment Diversion (MBSD) project may affect a resident population of bottlenose dolphins. The approach combines three tasks: (1) using empirical effort, sightings, and photo-identification data to describe the abundance and distribution of dolphins in the region; (2) applying a hydrodynamic model to predict when and where low-salinity water conditions may occur; and (3) deriving a quantitative relationship (informed by expert opinion) to link dolphin survival to exposure to low-salinity conditions of varying magnitude and duration. Collectively, the evidence presented supports the authors' conclusion that the Applicant's Preferred Alternative will result in a ~34% (95% CL: 15.3%-62.7%) drop in average annual survival of dolphins relative to the No Action Alternative. The report makes good use of available data, and supplements this with expert opinion where necessary. The conclusions are supported by the data, but the report could be strengthened in two ways. First, it should be clarified for non-expert readers that a 34% decline in adult survival represents a very large change in a vital rate of a long-lived mammal like the bottlenose dolphin, in which adult survival is a conserved trait typically found to be ~0.95. Secondly, the report would benefit from a brief description of the conservation context in which this action is being assessed. The estimated drop in adult survival of ~34% is not occurring in a pristine population, but rather one that is already experiencing reduced adult survival (McDonald et al. 2017) and reduced reproduction (Lane et al. 2015). Taken together, these factors suggest that the proposed action may cause long-lasting impacts on abundance of resident bottlenose dolphins, and ultimately, may affect the long-term viability and conservation status of the population. This last sentiment is alluded to in the report, but it should be made explicit.

Reviewer biography

Dr. Williams is a marine conservation scientist with an emphasis on the impacts of noise and disturbance on whales and dolphins. His work addresses two broad themes: estimating wildlife abundance, distribution, and conservation status; and assessing impacts of human activities on marine wildlife populations. His research has won several prestigious awards: the 2009-10 Canada-U.S. Fulbright Research Chair at University of Washington, comparing Canadian and U.S. policy to protect endangered killer whales from ocean noise and include their prey requirements in ecosystem-based salmon fishery management; a Marie Curie International Incoming Research Fellowship (2010-2012) to study population consequences of noise in three endangered whale populations; and the Pew Fellowship in Marine Conservation (2015-2018) to understand impacts and guide solutions to the problem of chronic ocean noise. He has been a member of the International Whaling Commission's Scientific Committee since 2001 and the IUCN Cetacean Specialist Group for several years. Dr. Williams was a member of Canada's Resident Killer Whale Recovery Team, participated in two of DFO's recent Technical Working Groups to promote southern resident killer whale (SRKW) recovery, and was a member of the vessels working group of Governor Inslee's SRKW Task Force. Most recently, he coordinated an international, interdisciplinary effort to model the relative importance of the three main threats to SRKW recovery. He has a particular interest in assessing the impacts of cryptic forms of human-caused mortality (e.g., oil spills, bycatch in unmonitored fisheries) to endangered or data deficient species.

Description of Review Activities

Dr. Williams served as an independent expert in this Center for Independent Experts (CIE) review to conduct an impartial and independent peer review following the Performance Work Statement (Appendix 2), OMB guidelines, and the Terms of Reference. As part of his review activities, he attended a pre-review, virtual workshop, evaluated all background material, and developed an independent peer review report addressing the review Terms of Reference.

Findings by Terms of Reference

As requested in the Terms of Reference, my answers below address the following questions:

1. Are the statistical approaches applied in each section of the document appropriate to the problems addressed and are the results properly supported considering the available input data and statistical assumptions?

The authors have compiled a great deal of high-quality data to inform their risk assessment. Indeed, it may be the sheer volume of material on the population that made Section I somewhat difficult to follow. (Most of my comments relate to Section I, given my area of expertise.) Three of the major inputs to this risk assessment include: abundance of dolphins in the study area/population; distribution within the study area; and current average annual survival rates. The presentation sometimes made it difficult to follow when the authors were referring to background information and when they were referring to results of their own newer studies.

For example, the material on page 3 refers to a spatially explicit capture recapture (SECR) study by McDonald et al. (2017), which provided information on absolute abundance, true survival, and spatial information (generally thought of in terms of home range of dolphins in an SECR framework, but with some questions about site fidelity or movement implied). That paragraph includes the following two sentences: "*Density estimates for the surveyed region were derived using spatially explicit capture-recapture models, and these densities were extrapolated to cover the entire range of the stock (McDonald et al. 2017). The objective of this study was to conduct capture-mark-recapture surveys of bottlenose dolphins to provide a current abundance estimate and characterize spatial distribution within the stock range.*"

This led me to believe that the current study used the same SECR methods as McDonald et al. (2017), and importantly, added another year of data to the four years of data on the same individuals as those presented in McDonald et al. (2017). Instead, the new study used an excellent Robust Design survey for a single year (2019), but the data were analyzed in isolation. The distribution data came from a density surface model using simple spatial smooths and assumed a constant 50m strip width. A simple density surface model using location terms alone is likely to provide an accurate description of the average distribution of animals at the time of the survey, but without any mechanistic model terms (e.g., dolphins feed in a certain depth preference, or prefer a particular temperature range), the model may not be very useful for predictive purposes. Similarly, if the survey involved collecting distance and angle to each sighting, the data could be used to estimate density and abundance of dolphins from the distance sampling side of the survey to estimate average number of dolphins in the survey region at the time of the survey.

Each of the methods referred to above have their strengths and weaknesses in estimating the three parameters of interest for the risk assessment: absolute abundance; true survival; and average distribution. The Robust Design surveys provide excellent snapshots of the number of dolphins in the population that ever visit the study area, but the reliance on a single year (2019) prevented the authors from estimating true survival. I presume that the new survival estimates presented reflect apparent survival, in which mortality is confounded with temporary emigration. It is unclear why the IDs were not paired with the data from 2010-2014, so that an updated estimate of true survival could be generated. Such an analysis would also give a quantitative estimate of temporary emigration, which could be used to inform the simulations of movement (and therefore exposure to low-salinity conditions). The Robust Design (RD) from 2019 presumably gives some information on temporary emigration, but this is not presented. The spatial model is a simple one. The authors mention some extrapolation issues, which makes me think that a 2D smoother, soap-film smoother, or a CReSS model would have been better than running two, one-dimensional smooths (Scott-Hayward et al. 2014)). It is unclear why the authors did not use the spatial model to estimate abundance as well, by numerically integrating under the fitted density surface. The spatial model should, like any distance sampling survey, estimate the average number of animals in the survey area at the time of the survey (Hedley and Buckland 2004). Broadly speaking, the RD (capture-mark-recapture) survey estimates the total number of unique individuals in the population that had a non-zero probability of being in the survey region during the study period, whereas a line-transect survey estimates the average number of individuals in the survey region at the time of the survey. These two complementary ways of thinking about population size are important to a risk assessment like this one. The abundance estimate from the spatial model should be smaller than the one from the RD survey. There is information contained in the extent to which the distance sampling estimate is smaller than the mark-recapture estimate. If the estimates are the same, then the dolphins really do show strong site fidelity and little movement outside the area. If the density surface model generates a much lower estimate than the RD approach, then the population may be more "open" than we thought (or the survey violated the assumption that all animals out to 50m were detected with certainty).

The reason these seemingly trivial details matter is that the Expert Elicitation portion (Section III) of the report (i.e., the expected impact of prolonged exposure to low salinity conditions on dolphin survival) is very compelling. The fact that the proposed action is likely to reduce adult survival by 34% represents a profound perturbation to a long-lived animal. It is important that the report present clearly, to naïve readers, whether this represents a 34% drop in survival rate from the 0.95 one might expect for a generic population of bottlenose dolphins, based solely on life history (Taylor et al. 2007), the empirical estimates of adult survival ranging from 0.8 to 0.85 for BBES dolphins following DWHI (McDonald et al. 2017), the estimate of 0.890 presented in the No Action Alternative (Section 3, page 62), or some new survival estimate derived from a new Robust Design analysis. All raise serious concerns for conservation and management, but as Section 3 states clearly, the initial conditions may make the difference between a depleted population that remains viable, or such severe depletion that the stock may become extirpated.

The caption for Fig I.9 is poorly worded: "Areas with CV > 0.4 are masked from the resulting surface given high model uncertainty when projecting outside of the range of survey data." It would help to know if the censoring (masking) was determined by uncertainty (CV>0.4), or the need to extrapolate beyond the range of data. I see how the two can be conflated, but it's important to be clear, here, given the essential task of quantifying uncertainty as well as we can. It could be that some of these areas are within the range of the survey data, but CVs are still >0.4, simply because the model has relatively poor explanatory power. Clarification is needed.

Overall: I believe all of the required information is in this report (i.e., it accurately describes and quantifies uncertainty), but I would encourage some careful editing of the background section of Section 1, so that naïve readers can understand the novelty of the 2019 data and analysis, how the new data fit into what we already know about the BBES stock, the context of the proposed action, and the conservation status of the population.

2. Is the approach to incorporating uncertainty in Delft3D model predicted salinity values (described in Section II) appropriate, and does the analysis accurately describe and quantify uncertainty where possible?

The Delft3D model (Section II) is the part of the report I feel least qualified to review. I am familiar with the use of GAMs and GAMMs but do not have a background in hydrological models. This section outlines appropriate ways to test for autocorrelation, and I am confident that that has been dealt with correctly.

Section II might benefit from expanding the section on retrospective model fitting and using the fitted model for prediction. One of the aims was "*making predictions of the influence of salinity on dolphin survival rates at all locations in the bay.*" Given the importance of using the model for prediction, I expected to see an argument for parsimony here. But in the model outputs (e.g., Appendix II.A1: Summary of Generalized Additive Mixed Model for Cluster 1), I see that the smooth of Julian day was fitted with the default degree of wiggliness in mgcv (k=20), and in many cases, the models approached the maximum 19 estimated degrees of freedom. I have no expertise in modelling salinity fields. But the section does seem to be lacking a description of any theoretical mechanism that would necessitate 18 or 19 degrees of freedom to predict spatial or temporal patterns in salinity. Hitting the bounds of the allowable degrees of freedom (k=20) is often a sign that the model is struggling to fit the data. I wonder if this, coupled with an extremely flexible spline, could result in problems when the model is used to predict beyond the range of observed data.

Overall: I believe all of the required information is in this section of the report (i.e., it accurately describes and quantifies uncertainty), but I am unclear whether all of the uncertainty has been correctly propagated into the dolphin survival stage of the modelling process (Section III). In addition to using the point estimate (after bias correction) and variance, it may be useful to run a scenario in Section III that uses a pessimistic (or worst-case) scenario from Section II, in order to better propagate the total uncertainty about the inputs (not just the parameter estimates, but the model structure) through the dolphin survival model to the final outputs.

3. Does the low salinity exposure model (Section III) adequately and accurately describe and account for the various sources of uncertainty (e.g., uncertainty in the Expert Elicitation dose-response model, abundance estimation, and dolphin movement model)? Are the key model inputs described and do they represent the best available data?

Section III was well written and well described. I found the dolphin movement part of this model the least well explained. I would have liked to see this tied back to empirical data on Section 1 (e.g., the difference between population size estimated from the mark-recapture and the density surface models) to understand the degree to which this closed population is truly closed. Ultimately, I would like to see a description of how the expert judgment can be updated with empirical data. This concept was alluded to on P65: "*It is notable that a recent natural event resulting in increased freshwater input into Mississippi Sound was followed by substantially increased dolphin mortality with as little as 20-40 days of lowered salinity, not all of which were* *consecutively below 5 ppt (Garrison, unpublished data). The observation of an increase in mortality associated with extended exposure to freshwater in an estuarine bottlenose dolphin population is consistent with the expectations from this model.*" It seems reasonable that natural experiments like this could be incorporated into some Bayesian version of the dose-response curve derived from expert elicitation.

Overall: Expert elicitation is a useful way to describe and account for various sources of uncertainty, especially if the state of knowledge on this topic will remain inadequate to support decision-making in the near future. The authors allude to a single event (Garrison, unpublished data) that could be used to provide a rough, quantitative guide to the increase in mortality over baseline that one could expect from an unexpected drop in salinity. I recommend the authors provide more information on this unusual natural experiment (e.g., a point estimate of the increased mortality observed over some baseline), so we can compare this to the model's predicted levels of impact.

The issues I raise above (points 1-3) represent mostly issues of presentation, rather than substance. At each step, the authors make explicit mention of assumptions, uncertainty, bias, precision, and add appropriate caveats. My comments (particularly under point 1) reflect a desire to see all of that presented in a way that would be slightly easier for a new reader to follow.

Overall: I believe that the report uses the best available data (supplemented with expert elicitation), appropriate models, and that the results are plausible. In my opinion, there is one source of uncertainty or bias that could be better addressed in the report. On P58, the authors write: "*It should be noted that the model does not include other processes that may impact dolphin survival or a baseline survival rate. Predicted survival rates should therefore be interpreted as the change in survival solely due to exposure to low salinity in a given year.*" This strikes me as an area where the authors could have used additional information that is already available. The authors have already cited information by McDonald et al. (2017) that showed that annual average survival rates currently range between 0.80 and 0.85, which is down from a typical baseline of 0.95. Given the analytical sophistication of the rest of the report, it is unclear why this crucial result is presented in relative terms (i.e., a drop of 34%), rather than absolute terms (i.e., a compromised population with already low survival rates is expected to undergo a more precipitous decline).

4. Are the conclusions presented appropriate and supported by the available models and data?

The key conclusion is presented clearly in the Executive Summary: "*mean population survival rate will decline by an estimated 34% (95% CL: 15.3%-62.7%) in any given year in the first decade under the Applicant's Preferred Alternative based upon the representative hydrograph, and the greatest impacts would be on dolphins inhabiting the central and western portions of the Bay. The projected reductions in survival would likely result in substantial declines in bottlenose dolphin population size over the short-term.*" The authors present a chain of logic that links the data and analyses used to justify each step in that chain—how many animals live in the area, how they are distributed, how they are likely to be exposed to low-salinity water, and how likely that exposure is to result in decreased survival. The decision to end the analyses at "effects on survival" rather than abundance or population viability is an unusual one, and no doubt reflects specific terms of reference or other constraints. The report would benefit from a final paragraph placing these predicted decreases in survival in some broader context (e.g., these are large relative to the lagged effects of DWHI on dolphin survival; these are large or small relative to other anthropogenic stressors). The report fails to mention evidence that declines in adult survival may not be offset by recruitment, given evidence that declines in reproduction observed in Barataria Bay dolphins (Lane et al. 2015). Alternatively, the report could build on the qualitative statements on the last few pages and add some quantitative analyses to show how these reduced survival rates translate into declines in abundance, and in some scenarios, could jeopardize the viability of the stock. A 34% drop in average annual survival rate is extremely detrimental to a long-lived, slowly reproducing species like bottlenose dolphin. Depending on the audience, that point may need to be made more directly.

Overall: The conclusions made are appropriate and supported by the available models and data. But I believe that the conclusions could be made more explicitly. And it would be my preference to see the results go beyond a predicted drop in relative survival rates to a more meaningful, quantitative analysis of population trends or population viability analysis, or a comparison of the predicted population-level consequences to some conservation or management objective, target, or threshold (e.g., potential biological removal (Wade 1998), the need for a Zero Mortality Rate Goal for sublethal anthropogenic impacts (Williams et al. 2016), or a precautionary message about the likelihood of decline relative to the probability of being able to detect it (Taylor et al. 2000)).

References

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Wade, P.R., 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. Marine Mammal Science, 14(1), pp.1-37.

Williams, R., Thomas, L., Ashe, E., Clark, and Hammond, P.S., 2016. Gauging allowable harm limits to cumulative, sub-lethal effects of human activities on wildlife: A case-study approach using two whale populations. *Marine Policy*, *70*, pp.58-64.

Appendix 1: Bibliography of materials provided for review

Booth, C. Summary of an Expert Elicitation on the Effects of Exposure to Low Salinity in Estuarine Bottlenose Dolphins. Presentation.3

Booth, C. Debrief of an Expert Elicitation on the Effects of Exposure to Low Salinity in Estuarine Bottlenose Dolphins.

McDonald, T.L., Hornsby, F.E., Speakman, T.R., Zolman, E.S., Mullin, K.D., Sinclair, C., Rosel, P.E., Thomas, L. and Schwacke, L.H., 2017. Survival, density, and abundance of common bottlenose dolphins in Barataria Bay (USA) following the Deepwater Horizon oil spill. Endangered Species Research, 33, pp.193-209.

Sadid, K., Messina, F., Hoonshin, J., Yuill, B, Meselehe, E. (2018). Basinwide Model Version 3: Basinwide model for mid-Breton Sediment Diversion Modeling. The Water Institute of the Gulf. Prepared for and funded by the Coastal Protection and Restoration Authority under TO51. Baton Rouge, LA.

Schwacke LH, Thomas L, Wells RS, McFee WE and others. (2017). Quantifying injury to common bottlenose dolphins from the Deepwater Horizon oil spill using an age-, sex- and class-structured population model. Endang Species Res 33:265- 279. https://doi.org/10.3354/esr00777

Wells, R. S., L. H. Schwacke, T. K. Rowles, and others. (2017). Ranging patterns of common bottlenose dolphins Tursiops truncatus in Barataria Bay, Louisiana, following the Deepwater Horizon oil spill. Endang Species Res 33:159-180. https://doi.org/10.3354/esr00732

Appendix 2: CIE Performance Work Statement

Predicting the effects of low salinity exposure associated with the Mid-Barataria Sediment Diversion project on resident common bottlenose dolphins (Tursiops truncatus) in Barataria Bay, LA.

Background

The National Marine Fisheries Service (NMFS) is mandated by multiple statutes to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science and without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards. (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf). Further information on the CIE program may be obtained from www.ciereviews.org.

Scope

The Mid-Barataria Sediment Diversion (MBSD) project is part of the State of Louisiana's Coastal Master Plan to mitigate the long-term effects of land and marsh loss. The MBSD project is a multi-decade project that is designed to reconnect the flows of freshwater, sediment, and nutrients from the Mississippi River into the northern portion of the Barataria Basin on an annual basis. In the current planning phase, several possible maximum outflow volumes are being considered, with the preferred alternative (Applicant's Preferred Alternative) capping the maximum instantaneous inflow from the project at 75,000 cubic feet per second. The actual amount of freshwater outflow into the Basin would vary depending upon Mississippi River flow volumes.

While the MBSD project is projected to create new wetlands and reduce the net land loss over the 50-year project life, the annual influx of large volumes of freshwater is expected to result in significant changes in this estuarine system. In particular, there is a resident population of common bottlenose dolphins (*Tursiops truncatus*) which is expected to experience increased exposure to low salinity water on an annual basis during the MBSD operations compared to projected conditions without the diversion. Prior studies have demonstrated that exposure to low salinity water can have negative effects on bottlenose dolphin health and survivorship. Previous studies have also demonstrated that resident populations in estuarine systems maintain strong site-fidelity even in the presence of negative environmental changes or depletions in prey availability.
In this analysis, NMFS developed a simulation approach to evaluate the probable effects of changes in salinity in Barataria Bay, LA associated with the Mid-Barataria Sediment Diversion

(MBSD) project on the resident common bottlenose dolphin stock. Daily salinity surfaces from the Delft3D hydrodynamic model were used to assess the changes in the distribution of low salinity (<5 ppt) in the Bay and subsequent projected impacts on the bottlenose dolphin population. We used information on the initial spatial distribution of dolphins, simulated dolphin movements, modelled exposure to low salinity, and an expert elicitation-based dose-response curve relating exposure to low salinity to survival to estimate expected annual survival rates for the bottlenose dolphin population. This analysis focusses exclusively on the survival impacts of low salinity exposure in a given year and does not consider other ecological or environmental effects or cumulative effects over time.

The outcome of this analysis, along with information on other potential impacts of the projects on bottlenose dolphins, will be used to inform an Environmental Impact Statement under the National Environmental Policy Act (NEPA) and the Natural Resource Damage Assessment (NRDA) Restoration Plan under the Oil Pollution Act (OPA) to determine the probable level of impact to bottlenose dolphins from the MBSD project under a range of possible diversion scenarios. Given the importance and magnitude of the MBSD project, it is important that the science used to predict potential impacts on survival rates in this marine mammal population represents the best available science. Therefore, the CIE reviewers will conduct a peer review of the scientific information in the low salinity exposure model based on the Terms of Reference (TORs) referenced below. Given the public interest, it will be important for NMFS to have a transparent and independent review process of the model used in this assessment.

The specified format and contents of the individual peer review reports are found in **Annex 1**. The Terms of Reference (TORs) of the peer review are listed in **Annex 2**.

Requirements

NMFS requires three (3) reviewers to conduct an impartial and independent peer-review following the PWS, OMB guidelines, and the TORs below. The reviewers shall have a working knowledge and recent experience in at least one of the following: (1) population modeling, (2) quantitative ecology, and/or (3) ecology, physiology, or population dynamics of bottlenose dolphins.

Tasks for Reviewers

1) Review the following background materials and reports before the review:

Booth, C. Summary of an Expert Elicitation on the Effects of Exposure to Low Salinity in Estuarine Bottlenose Dolphins. Presentation.

McDonald, T. L., F. E. Hornsby, T. R. Speakman, E. S. Zolman and others. 2017. Survival, density, and abundance of common bottlenose dolphins in Barataria Bay (USA) following the *Deepwater Horizon* oil spill. Endang Species Res 33:193-209. https://doi.org/10.3354/esr00806

Sadid, K., Messina, F., Hoonshin, J., Yuill, B, Meselehe, E. 2018. Basinwide Model Version 3: Basinwide model for mid-Breton Sediment Diversion Modeling. The Water Institute of the Gulf. Prepared for and funded by the Coastal Protection and Restoration Authority under TO51. Baton Rouge, LA.

Schwacke LH, Thomas L, Wells RS, McFee WE and others (2017) Quantifying injury to common bottlenose dolphins from the *Deepwater Horizon* oil spill using an age-, sex- and class-structured population model. Endang Species Res 33:265-279. https://doi.org/10.3354/esr00777

Wells, R. S., L. H. Schwacke, T. K. Rowles, and others. 2017. Ranging patterns of common bottlenose dolphins *Tursiops truncatus* in Barataria Bay, Louisiana, following the *Deepwater Horizon* oil spill. Endang Species Res 33:159-180. https://doi.org/10.3354/esr00732

2) Desk Review: Each CIE reviewer shall conduct the independent peer review in accordance with the PWS and TORs, and shall not serve in any other role unless specified herein. Modifications to the PWS and TORs cannot be made during the peer review, and any PWS or TORs modifications prior to the peer review shall be approved by the NMFS Project Contact.
3) Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent report consistent with the PWS. Each CIE reviewer shall complete the independent peer review in the required format and content as described in **Annex 1**. Each CIE reviewer shall complete the independent peer review addressing each TOR as described in **Annex 2**.
4) Deliver their reports to the Government according to the specified milestones dates.

Place of Performance
Each CIE reviewer shall conduct an independent peer review as a desk review, therefore no travel is required.

Period of Performance
The period of performance shall be from the time of award through September 2020. The CIE reviewers' duties shall not exceed 10 days to complete all required tasks.

Schedule of Milestones and Deliverables
The contractor shall complete the tasks and deliverables in accordance with the following schedule.

Schedule	**Milestones and Deliverables**
Within two weeks of award	Contractor selects and confirms reviewers
No later than two weeks before the review	Contractor provides the pre-review documents to the reviewers
August 2020	Each reviewer conducts an independent peer review as a desk review
Within two weeks after review	Contractor receives draft reports
Within two weeks of receiving draft reports	Contractor submits final reports to the Government

Applicable Performance Standards
The acceptance of the contract deliverables shall be based on three performance standards:
(1) The reports shall be completed in accordance with the required formatting and content; (2) The reports shall address each TOR as specified; and (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel
Since this is a desk review travel is neither required nor authorized for this contract.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

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Annex 1: Peer Review Report Requirements

1. The report must be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether or not the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the TORs.

3. The reviewer report shall include the following appendices:
    a. Appendix 1: Bibliography of materials provided for review
    b. Appendix 2: A copy of the CIE Performance Work Statement

Annex 2: Terms of Reference for the Peer Review

The reviewers will provide a scientific peer-review of the following document:

Garrison, LP, Litz, J, and Sinclair, C. 2020. Predicting the effects of low salinity associated with the MBSD project on resident common bottlenose dolphins (*Tursiops truncatus*) in Barataria Bay, LA. NOAA Technical Memorandum SEFSC-XXX, 85 pgs.

The reviewers will provide input on the following questions:

1. Are the statistical approaches applied in each section of the document appropriate to the problems addressed and are the results properly supported considering the available input data and statistical assumptions?
2. Is the approach to incorporating uncertainty in Delft3D model predicted salinity values (described in Section II) appropriate, and does the analysis accurately describe and quantify uncertainty where possible?
3. Does the low salinity exposure model (Section III) adequately and accurately describe and account for the various sources of uncertainty (e.g., uncertainty in the Expert Elicitation dose-response model, abundance estimation, and dolphin movement model)? Are the key model inputs described and do they represent the best available data?
4. Have the sources of uncertainty and caveats in the analysis been adequately described? Is the treatment of the bias and uncertainty in the analysis adequate given the scope and scale of the project? Are there additional potential sources of uncertainty that can be quantified and should be incorporated into the model?
5. Are the conclusions presented appropriate and supported by the available models and data?