Center for Independent Experts Independent Peer Review Report

on

An Aquaculture Opportunity Atlas for the U.S. Gulf of Mexico

and

An Aquaculture Opportunity Atlas for the Southern California Bight

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1. Executive Summary

Aquaculture is a key industry to fulfil seafood demand. However, its expansion requires the identification of suitable areas that fulfil environmental and technical conditions while minimising conflicts with other existing maritime activities. The two Atlases reviewed in this report aim to identify Aquaculture Opportunity Areas (AOA) in the Gulf of Mexico and Southern California Bight that are suitable for commercial offshore aquaculture development. AOAs are identified based on the best available science and through public engagement to facilitate aquaculture production whilst supporting environmental, economic, and social sustainability and minimizing unnecessary natural resource use conflicts. Both Atlases provide relevant information that can be used to assist agency decision makers to identify areas that may be suitable for locating Aquaculture Opportunity Areas (AOAs).

The literature cited is correct and up-to-date. The method implemented is scientifically sound and adequately addresses issues related to identifying AOAs in the framework of ecosystem-based Marine Spatial Planning. The data collated and used to run the developed models appears to be the best available information at the time the work was performed.

Main recommendations are synthesized below:

- Data uncertainty should be further analysed, especially for fishing activity.
- Clarification is needed regarding the way the information on spatial distribution of marine traffic and fishing activity have been categorised for their integration into the suitability sub-models.
- In both reports, the need for high resolution seafloor maps and benthic habitat maps should be highlighted for the identification of sensitive or vulnerable habitats.
- The oceanographic characterization is not detailed enough to guarantee that the identified AOAs are suitable for all types of aquaculture technologies and cultivated species. Thus, further research is recommended in subsequent steps of the process.
- Units of measurement should be standardized (acres, km, miles, nautical miles, feet and metres) and used consistently.

- The setback values used for certain features should be better justified. For example, 500 ft is used for rocky seafloor, while 500 m is applied to coral reefs. The reports should indicate whether those values are adopted from existing policies, scientific criteria or other sources.
- Amendment of minor editing issues and typographical errors are needed through both reports.

In conclusion, the work described in both reports is of high scientific and technical quality and fulfils the goals that were set out. Certainly, the information provided by the Atlases will be of high value to inform agencies prior to embarking on permitting processes, avoiding space-use conflicts, addressing public concerns, and supporting aquaculture planning and expansion.

2. Background

The global increase in demand for sustainable seafood products is making fish and shellfish the most heavily traded food commodity worldwide. The US has recognized the need to reduce its seafood product trade deficit, augment production towards meeting future domestic food needs and contribute to the global seafood supply. Nevertheless, fisheries and aquaculture need to be responsibly managed to meet the surging demand for sustainable seafood.

Aquaculture is a key industry to fulfil seafood demand. The increasing demand for U.S. grown seafood and the improved technology to farm in open ocean sites provides opportunities for aquaculture expansion. Technological innovations in the aquaculture field have now made it possible to culture species in coastal and offshore environments. Offshore open ocean waters are a new frontier providing space for aquaculture expansion. However, this is restricted by a series of technical, environmental, and social restrictions. Furthermore, an ecosystem approach to aquaculture requires the application of marine spatial planning techniques to ensure equitable shared use of resources.

NOAA's National Centers for Coastal Ocean Science (NCCOS) have initiated a marine spatial planning process to identify potential Aquaculture Opportunity Areas (AOA) and options for offshore aquaculture development in the federal waters of the Gulf of Mexico and the Southern California Bight. Both Atlases provide guidance for minimizing environmental impacts to wild fisheries, habitat, and biodiversity and to evaluate socioeconomic considerations. A critical element needed by coastal resource managers and stakeholders is the awareness and confidence to use geospatial analytical tools and science to help inform about regulation and environmental protection whilst also equitably resolving points of resistance to industry development.

The result of such processes are two atlases aimed at the identification of AOA suitable for commercial offshore aquaculture development. AOAs are identified based on the best available science and through public engagement to facilitate aquaculture production; support environmental, economic, and social sustainability; and minimize unnecessary resource use conflicts.

3. Description of the Reviewer's Role in the Review Activities

My role as an independent reviewer was to conduct an impartial and independent peer review of the *Aquaculture Opportunity Atlas for the U.S. Gulf of Mexico* and the *Aquaculture Opportunity Atlas for the Southern California Bight*, with respect to the pre-defined Terms of Reference (Appendix 2, Annex 2).

I gained access to both draft reports on the 6th of August 2021. I have read both reports, all the background information papers and reports, and all other relevant documents. I have also searched for, collected, and read references relevant to the topics covered in the reports and the Performance Work Statement (PWS) prior to the Review.

On the 18th of August an online meeting was held for the introduction to the Atlas and for clarification of any questions, both regarding the technical aspects as well as the coordination required.

During the meeting it was agreed that a review report would be submitted by the 5th of September. It was also agreed that one report containing the findings of the two Atlases would be submitted.

This report summarizes my independent findings and recommendations for the review.

4. Summary of findings

4.1. General comments

As both documents show commonalities in terms of the background situation regarding aquaculture production as well as the methodology implemented for the identification of AOAs, the present section indicates general comments regarding the common content of the two reports. This is mainly focused on the methodological approach that has been implemented in both studies.

The workflow and process used for alternative site suitability for the AOA analysis is reasonable and it considers all the steps needed for aquaculture sites identification.

Firstly, since in both cases the geographical extent of the study area is very large, biogeographical breaks were identified using the marine ecoregion approach. This is a good starting point for the identification of suitable ecological conditions for the establishment of aquaculture activity. Nevertheless, special caution should be taken with this approach as within the Areas of Interest identified, particular oceanographic conditions could be found which would affect the environmental conditions for aquaculture production. Nevertheless, as this is a broad scale of analysis, this criterion could be considered as reasonable.

A categorical framework was developed to ensure relevant, comprehensive data acquisition and characterization for spatial suitability modelling. This guaranteed a transparent and replicable approach when identifying relevant information sources. Transparency in the identification of relevant factors affecting the identification of AOAs is highly relevant both for the identification of AOAs, as well as when showing the results to stakeholders. In the framework of ecosystem-based marine spatial planning, it is of utmost importance for governance aspects, as well as for the identification of potential conflicts with other marine users and industries, to identify the potential solution of conflicts if they appear.

Based on the data framework, an authoritative spatial data inventory was developed that included data layers relevant to administrative boundaries, national security (i.e., military), navigation and transportation, energy and industry infrastructure, commercial and recreational fishing, natural and cultural resources as well as the overall

oceanography, resulting in over 200 data layers being included in the analysis performed for each Atlas. In that sense, the amount of information used for the model is impressive. As a reviewer, not having detailed knowledge of the study sites, one could think that all the most relevant information layers have been included in the analysis.

The spatial modelling approach was specific to the planning goal of identifying discrete areas that met the industry and engineering requirements of depth and distance from the shore and were the most suitable for all types of aquaculture development including the cultivation of finfish, macroalgae, shellfish, or a combination of species. The approach is reasonable in this first phase of identifying aquaculture sites, but it should also be considered that the threshold values applied for depth and distance to harbours could vary for different aquaculture techniques or species. For example, the frequency of visits to aquaculture premises for finfish or bivalves is very different and incurs very different economic costs for the producer. Thus, the distance factor can make one site suitable for one production technique and unsuitable for another.

In both documents it is stated that a stakeholder consultation was performed. However, there is no detailed information on the representativeness of the stakeholders that participated in such a consultation process. This is an important point to highlight, especially in a marine activity siting process.

The effort invested in the collation of fishing activity data also has to be highlighted. Different sources of data have been used to generate the information layers. Layers produced from VMS data and AIS data are the most accurate and empirical when characterising the spatial and temporal intensity of fishing activity. For other fishing fleets (e.g., leisure), the authors acknowledge in the discussion section that “Caution should be taken when considering commercial fishing, pleasure craft and other vessel traffic data from electronic reporting sources such as AIS and VMS given that these sources of data typically under report. This could result in an underestimation of fishing activity in the area. According to the description of the data used, it seems that the best available information has been used, and thus seems to be adequate.

Regarding data processing for the integration of the information layers in the model, Automated Vessel Identification System Transit Count Data is used for marine traffic

information. Continuous data was reclassified on a 0.01 to 0.99 scale using Fuzzy Logic Membership Functions. Afterward, such information was categorised to be integrated into the model, but it is not clear which were the threshold values adopted when defining the suitability classes (i.e., unsuitable, low, moderate and high) for the industry navigation and transportation sub-models. In general terms, it is not clear to me, under which criteria the continuous data has been discretized and which have been the threshold values adopted (e.g., equal frequency).

Similarly, the same method is applied for fishing intensity maps derived from continuous data (VMS). In this case, for each fishing fleet, the final reclassification results in five classes defining fishing intensity, which are: Low, Moderately Low, Moderate, Moderately High and High. When all the information layers are integrated into the Fishing and Aquaculture Suitability Sub-model, it shows the results as Unsuitable, Low, Moderate and High (i.e., four classes). How has the integration been made from five classes into four? I.e., how have the classes of intensity been integrated into the sub-model?

Some of the fishing activity information layers are derived from VMS data. The continuous values data layers have been scored using a fuzzy logic Z membership function and the same weight has been given to all fisheries when running the model. Here, it should be considered that the fishing activity, and its spatial and temporal distribution, should also be linked to its socioeconomic relevance. The fuzzy logic Z membership function is adequate to produce information layers that represent the same range of values, which makes them easily integrated into the model. Nevertheless, in terms of conflicts of uses, and potential consequences of closing a certain area to fisheries: the fishing biomass, species fished, and the economic performance of the fisheries should also be taken into consideration. Therefore, using this integration method, all fisheries have the same weight in the suitability model, but in terms of socioeconomic relevance, they might be very different, and the socio-economic consequences of the closure of certain AOAs will be very different depending on the specific fishery or fishing fleet that might be affected.

In terms of oceanographic characteristics, for each of the AOAs, not only would it be necessary to give the maximum and minimum value of temperature or chlorophyll

registered for the observation period, but it would also be interesting (having already obtained those records) to indicate the time for different oceanographic parameters (e.g., temperature and chlorophyll as the most relevant ones). This is of special interest for aquaculture production. It would be interesting to know how much time a certain value of temperature or chlorophyll is kept during the year, as this is the relevant information when assessing the aquaculture production potential. Nevertheless, such analysis could be performed in a posterior and more detailed analysis at each AOA and for each aquaculture species. Thus, a more detailed characterization of oceanographic conditions should be performed in the next phase of the planning process.

Setback values applied to deep coral reefs, fish havens and artificial reefs should be justified. On the one hand, it would be better to use the same distance units for all setbacks such as feet and meters and use them consistently. A setback of 500-ft (152 m) was applied to fish havens and artificial reefs, whereas a setback of 500 m is applied to deep coral reefs. It would be interesting to see a justification for such values. Is there any legal document establishing such distance? If not, the adoption of such values should be supported by scientific evidence.

A final and minor general comment for both documents is that they avoid using acronyms in table and figure captions. They should be self-explanatory, independent of the content of the main body of the report.

It is also recommended to check the use of “coastal aquaculture” and “offshore aquaculture” throughout the reports.

4.2. Specific comments

Specific comments are provided individually for the two documents that have been reviewed:

4.2.1. An Aquaculture Opportunity Atlas for the U.S. Gulf of Mexico

The comments below are corresponding to “An Aquaculture Opportunity Atlas for the U.S. Gulf of Mexico. NOAA Technical Memorandum NOS NCCOS #XXX” by Riley KA, Wickliffe LC, Jossart JA, MacKay JK, Randall AL, Jensen BM, Bath GE, Balling MB, Morris JA Jr.

The review is classified into the subsections requested by the CIE Performance Work Statement:

4.2.1.1. **Comments on the methodology, assumptions, or other factors described within the draft reports to inform siting of aquaculture. Scientific methods soundness, assumptions, and analyses. Justification and interpretation to reach conclusions.**

Introduction

The background is well detailed and provides a good context describing the interest of developing offshore aquaculture. It provides an interesting background at the international level and the strategic interest of developing aquaculture activity in the U.S. The background is very well supported by the scientific literature and the technical reports cited.

Methodology

The approach implemented is adequate and fits with the final objective of the work. The data and information used for the implementation of the modelling approach is adequate. The used data and information are precise and up-to-date for the requirements of the objectives. A detailed description of the data and information layers is provided, including access to the publicly available data sources. This is an important point because it gives transparency to the planning process.

The modelling approach implemented is very well described and it is consistent with the objectives of the analysis.

Results

Results are well described, and provide a good synthesis of the information. The maps provided as final results of the implemented model are clear.

Discussion

The discussion is well structured and provides interesting information and a solid interpretation of the results. It provides interesting information of the main limitations

of the approach implemented as well as some limitations in terms of data accuracy (e.g., leisure fishing), AIS data and oceanographic variables.

Conclusions

The conclusions are well supported by the results of the analysis performed.

Annexes

Annexes provide detailed information, characteristics and metadata of the data used to feed the model. It is noteworthy that the annexes use high numbers of data sources and provide links to publicly available data and information layers.

Additional specific comments

Page 1 (line 34). You can add the reference below to the list of citations:

Galparsoro, I., A. Murillas, K. Pinarbasi, A. M. M. Sequeira, V. Stelzenmüller, Á. Borja, A. M. O´Hagan, A. Boyd, S. Bricker, J. M. Garmendia, A. Gimpel, A. Gangnery, S.-L. Billing, Ø. Bergh, Ø. Strand, L. Hiu, B. Fragoso, J. Icely, J. Ren, N. Papageorgiou, J. Grant, D. Brigolin, R. Pastres, P. Tett, 2020. Global stakeholder vision for ecosystem-based marine aquaculture expansion from coastal to offshore areas. Reviews in Aquaculture, 12: 2061-2079.

Page 9 (page 39 of the pdf) (L35-36) "*Further, an ecosystem approach to aquaculture requires the application of marine spatial planning techniques to ensure equitable shared use of resources (Stelzenmüller et al. 2017)*". The statement is too ambiguous and the term ecosystem approach to aquaculture has not been introduced before. When referring to Ecosystem Approach to Aquaculture, I suggest using the definition of FAO: "An ecosystem approach to aquaculture (EAA) is a strategy for the integration of the activity within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems." http://www.fao.org/3/i1750e/i1750e00.htm#:~:text=%E2%80%9CAn%20ecosystem%2

0approach%20to%20aquaculture,interlinked%20social%2Decological%20systems.%E2%80%9D

Page 10 (page 39 of the pdf file) (Lines 6-8) "*Regardless of the complexity or scale of the aquaculture objective, sustainable planning for **coastal** aquaculture requires spatially explicit information about suitable areas along with data from overlapping human activities to best characterize the dynamics of the marine environment (Kelly et al. 2014; Wever et al. 2015).*" I suggest removing the term "coastal" from that statement, as the Atlas is referring to offshore aquaculture.

Methods

Page 9 (line 37). You can add this reference in the citation:

Gimpel, A., V. Stelzenmüller, S. Töpsch, I. Galparsoro, M. Gubbins, D. Miller, A. Murillas, A. G. Murray, K. Pınarbaşı, G. Roca, R. Watret, 2018. A GIS-based tool for an integrated assessment of spatial planning trade-offs with aquaculture. Science of The Total Environment, 627: 1644–1655.

Page 27 (line 7). You can add the reference below to the list of citations:

Pınarbaşı, K., I. Galparsoro, Á. Borja, V. Stelzenmüller, C. N. Ehler, A. Gimpel, 2017. Decision support tools in marine spatial planning: Present applications, gaps and future perspectives. Marine Policy, 83: 83-91.

Page 28 (line 7). You can also add this reference here together with the ones cited:

Pınarbaşı, K., I. Galparsoro, D. Depellegrin, J. Bald, G. Perez-Moran, A. Borja, 2019. A modelling approach for offshore wind farm feasibility with respect to ecosystem-based marine spatial planning. Sci Total Environ, 667: 306-317.

Results

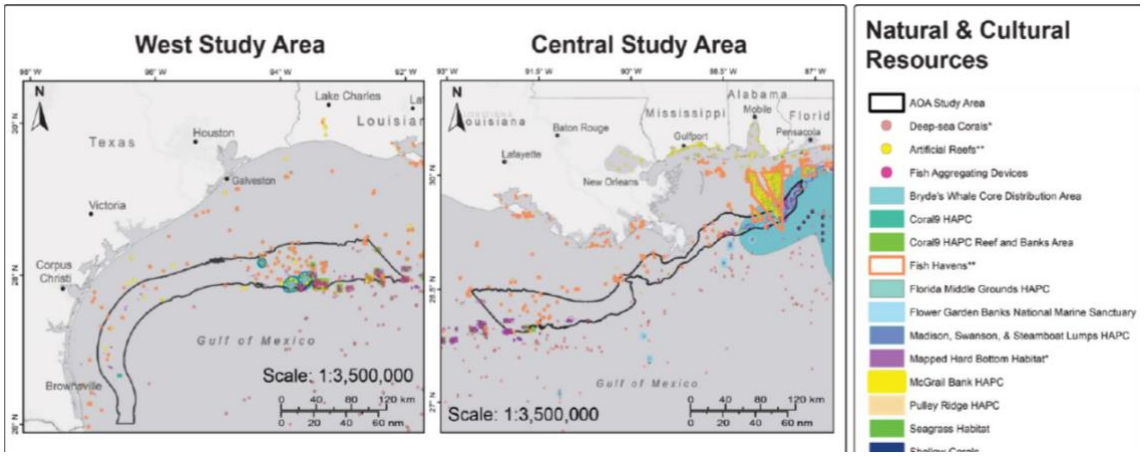
Natural and Cultural Resources (page 45).

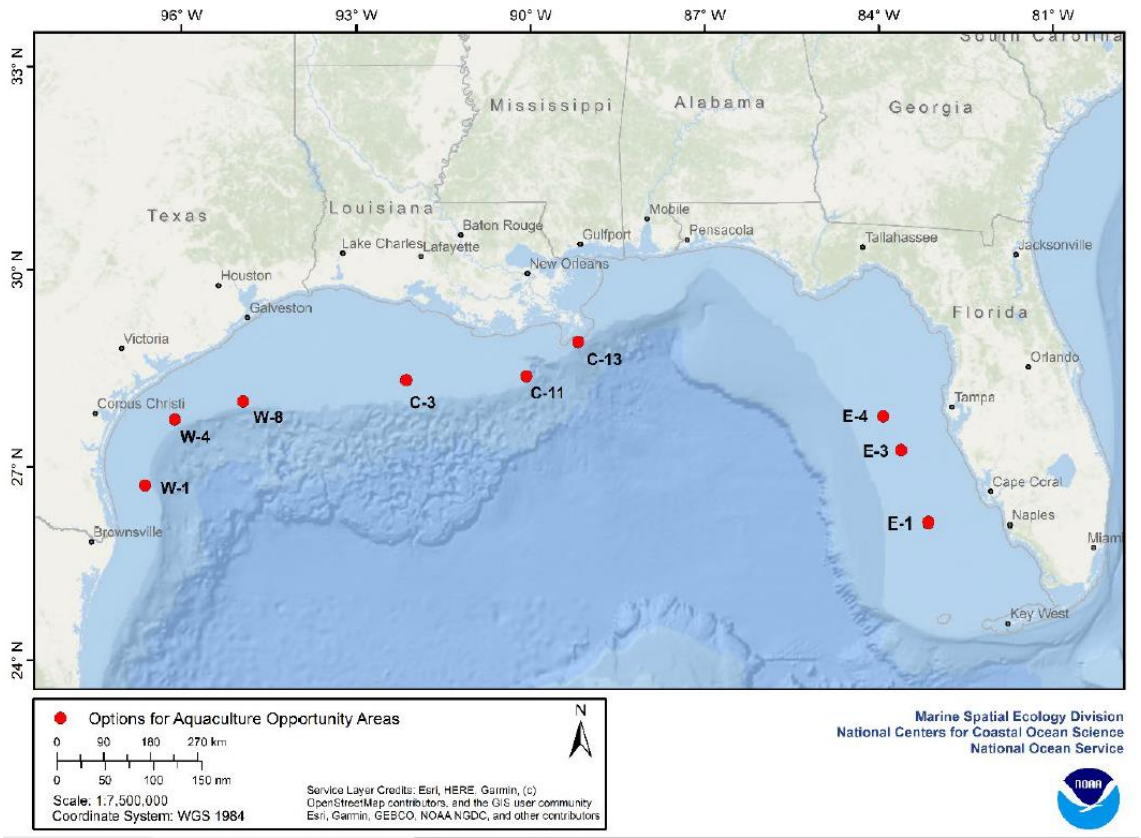
The benthic habitat distribution information is not very well described. It seems that certain habitat types have been considered (e.g., hard bottom), such as sensitive habitats, but are there no continuous benthic habitat distribution maps available for the study area? That would help to assign different levels of sensitivity of benthic habitats (including sedimentary habitats) to aquaculture activity.

"Protected Resource Considerations" scores range between 0.1-0.8. Considering the high level of overlap within the three sectors, it is not clear which are the specific scores given for each sector.

W-1 option (page 91) Line 8

"*The shallowest depths are in the southwest corner of the option, where there appears to be an increase in elevation due to a pinnacle-like feature intersecting the option*". Such a feature should be further studied. Is there any benthic habitat survey? Such pinnacle-like shapes could be associated with specific habitats like rock habitat, coral reefs, etc. Such a feature should be taken into consideration. Especially when considering the presence of deep corals in the surrounding areas.





Deep-Sea Coral Habitat Suitability maps available online indicate that such a geomorphic feature could be linked to the presence of corals. For the present work, the authors have only used empirical information on the presence of corals. This is an important point that should be verified in the second phase of the aquaculture siting, maybe by performing dedicated surveys. The verification of the presence of corals within the area is highly relevant as it is considered as an excluding factor.

https://marinecadastre.gov/oceanreports/@-10766560.030311482,3089075.7564014057/10/eyJ0IjoibnJjIiwiYiI6Im9jZWFuIiwiZiI6MCwicyI6MCwiYSI6ImM0MDNlNzE5OGEzYTJjM2Q5N2I5ZGUxZjRlOWE3N2VhIiwibCI6W119

The modelled layer indicates that such morphology is suitable for the presence of deep-sea corals.

AOA Option W-4

Page 108 (Line 5)

"*The lowest vessel type traffic types were pleasure craft*" This sentence should be corrected.

Page 108 (line 11) Commercial Fishing Considerations

"*NOAA NMFS fisheries data indicate W-4 overlaps with the designated Reef Fish Longline and Buoy Gear Restricted Area, and therefore no reef fish longline gear activity occurred in the option from 2007 - 2019*." This statement seems to be contradictory, and needs clarification.

AOA Option W-8

Page 121 (line 15) "*…and a maximum value of 31.0 °C on 7//2016*". Month is missing, unless it refers to July 2016.

Page 122 (line 16) "*loggerhead sea turtle sargassum critical habitat*". As far as I understood, the sargassum is the critical habitat for loggerhead sea turtles. Maybe, this statement should be rephrased for clarity.

Page 122 (line 17) "*No overlap occurs with deep-sea corals, fish havens, artificial reefs, or sensitive habitats (including HAPCs) and none are within a 3-km vicinity*". Maybe, this kind of statement could be made smoother by saying that "***Based on available data*** *no overlap occurs with deep-sea corals…*". This applies to the rest of AOAs. This is because, in some of the AOAs, multibeam echosounder-derived bathymetric information is not available. And even if there is high resolution bathymetry, there is only information on the seafloor morphology. Detailed benthic habitat characterisation would be necessary at each of the AOAs to discard the presence of corals or other sensitive benthic habitats. Those surveys should probably have to be performed during a more detailed characterization of the identified areas during the consenting processes and when preparing the Programmatic Environmental Impact Statement (PEIS). Thus, the identification of the AOAs performed here is the best one with the information available, but a certain degree of uncertainty still is present and should be considered in the Atlas.

Page 122 (line 30). Commercial Fishing Considerations

Page 123 Table 3.18. Characterization summary for AOA option W-8.

*Natural and Cultural Resources**

What does that asterisk mean? There is no footnote.

Page 126

Figure 3.55. Map depicting noteworthy characterization features for AOA option W-8.

It would be interesting to add additional labels for the isobath depths. I can imagine that the isobaths are for every metre.

Page 133

Figure 3.62. Option W-1 concentration of dissolved nitrates, phosphates, and silicates at different depth levels from the Ecological Marine Units (Sayre et al. 2017).

Check the figure caption or the data represented. The caption states that the graphs are corresponding to W-1 and should be W-8.

AOA Option C-3 Characterization

Page 140 (line 12) "*NOAA NMFS fisheries data indicate C-3 overlaps with the designated Reef Fish Longline and Buoy Gear Restricted Area, and <u>therefore</u> no reef fish longline gear activity occurred in the option from 2007 – 2019*". This statement seems to be contradictory. Clarify or rephrase.

Table 3.21. Characterization summary for AOA option C-3.

Natural and Cultural Resources*. Indicate what the asterisks stand for.

Table 3.21. Characterization summary for AOA option C-3.

Industry, Navigation, and Transportation

Oil and gas platforms

3 platforms are located between 0.5 km and 3.0 km (add "<u>outside the limits of the AOA</u>")

Petroleum boreholes (within 3 km) (add "<u>outside the limits of the AOA</u>")

49 boreholes are located between 0.5 km and 3.0 km (add "<u>outside the limits of the AOA</u>")

Oil and gas pipelines (within 3 km)

Pipelines are located between 0.5 km and 3.0 km (add "outside the limits of the AOA")

AOA Option C-11 Characterization

Page 153 (line 20) "*No multibeam or high-resolution bathymetry was found*". No "multibeam echosounder or high-resolution bathymetry was found"

Figure 3.79. "Option C-11 bathymetric surface and constraints within the vicinity of the option."

Option C-11 "bathymetry ~~surface~~ and constraints within the vicinity of the option" remove the word "surface", which is not necessary.

AOA Option C-13 Characterization

Page 169 (line 26) "No recent multibeam survey or high-resolution bathymetry was found". Add multibeam echosounder.

Page 171 (line 87) "*C-13 also overlaps with one of the NMFS-defined green sea turtle high use areas. overlaps with the Northwest Atlantic Ocean DPS for loggerhead sea turtle sargassum NMFS critical habitat area, but no other critical habitat*."

Delete full stop/period and add "and". It should read (if I properly understood):

C-13 also overlaps with one of the NMFS-defined green sea turtle high use areas **and** with the Northwest Atlantic Ocean DPS for loggerhead sea turtle sargassum NMFS critical habitat area, but no other critical habitat.

East Options Precision Modelling Results

Page 187

Figure 3.102. NOAA Economics: National Ocean Watch (ENOW) data for the ocean economy of the state in closest proximity to Central study area options.

Remove the upper part of the figure.

AOA Option E-4 Characterization

Page 189 (line 4) "*No recent multibeam or high-resolution bathymetry was found*". Multibeam echosounder.

Page 189 (line 8) *In the central eastern portion of the option, a small raised area occurs, where depths are the shallowest (49.5 m)*.

Such morphology could be linked to coral reefs. This point of uncertainty related to the presence of sensitive benthic habitats is not properly tackled in the results section, nor in the discussion.

AOA Option E-3 Characterization

Page 204 (line 22) *There are multiple high points within E-3 as well as a depression in the western portion*. Again, be careful with this kind of seafloor morphology because they could be morphological representations of coral reefs. It should be considered that there are hard bottom habitats in the surrounding areas (Figure 3.116). Thus, this hard bottom habitat could be also present within this AOA. Further surveys should be recommended.

AOA Option E-1 Characterization

Additional Characterization

NMFS Protected Resources Combined Data

Page 236. Table 3.39. Check the column size.

Essential Fish Habitat

Page 237. *Table 3.40. EFH species within the three options in the West study area. Each species' common name is listed in the table. For highly migratory species (HMS) EFH, an asterisk is next to the species name in the table. For all species listed, all life stage(s) are present in the AOI. Here, this is denoted as All for all life stages, a for Adult, j for juvenile, l for larvae, e for egg, n for **N**eonate) within the table. Life stages differ from corals, teleost fish, and elasmobranchs.*

Use capital letters as expressed in the table in the caption when referring to the meaning of each life stage. E.g., use "A" for **a**dult (adult, without a capital letter to be consistent with the rest of the sentence), "J" for juvenile, and so on. Neonate without capital letters.

The same applies for the next two tables.

4 DISCUSSION

Page 241. Table 4.1. should be moved to the next section (West Study Area), after its citation in the text.

Figure 4.2. should be located after its citation (second paragraph of page 247).

4.2.1.2. Data accuracy, quality, appropriateness, and application considered in the spatial analyses. Identification of additional relevant data or information not considered that should have been.

The report describes in detail all the data and information layers used for site suitability.

The definition of the general approach used for the definition of the suitability guides the data and information layers needed to be considered when identifying suitable areas for aquaculture and the definition of an AOA.

The datasets and information layers used are appropriate, and in general terms, they mainly catch all the potential conflicts of use concerning maritime activities and aquaculture. Nevertheless, as is highlighted in the discussion section and previously in this review, the suitability for the establishment of aquaculture should also consider a more detailed assessment of environmental conditions.

According to the description of datasets and information layers used, the quality and accuracy of the data could be considered as being high (especially for the definition of AOAs and considering that the final selection of the aquaculture siting will be further analysed within the AOAs).

It would have been interesting to include the integration of different benthic habitat types when analysing the sensitivity of benthic habitats for aquaculture activity, and not just considering coral reefs.

It would be strange to think that an overlooked factor would hinder the potential development of aquaculture activity in the identified AOAs. Especially considering the maritime activities that are referred to as constraints for the development of aquaculture activity.

4.2.1.3. Scientific literature and commercial information adequacy. Assumptions and uncertainties addressed.

The report includes all the relevant scientific literature, technical reports and background documents for the proper definition of AOAs. In particular, the cited scientific literature is relevant and up to date.

In particular, the scientific literature review and citations in the Methods section is very relevant and supports the approach implemented.

The methods and assumptions adopted during the data extraction and during the process of generating the information layers are transparent, and the assumptions adopted are reasonable, especially when considering the diverse data sources and nature of the data used. The method is scientifically sound, transparent and could be replicated or customized if necessary.

Data uncertainties are not addressed. Considering the data origin and sources, it is clear that the authors have used the best information available. The information layers came from official administrations or official data sources, thus, the uncertainty of such data and information layers is inherent to the source of the data. Some additional information regarding this point would have been interesting.

4.2.2. An Aquaculture Opportunity Atlas for the Southern California Bight

The comments below, are corresponding to "An Aquaculture Opportunity Atlas for the Southern California Bight. NOAA Technical Memorandum NOS NCCOS #XXX" by James A. Morris, Jr. Jonathan K. MacKay, Jonathan A. Jossart, Lisa C. Wickliffe, Alyssa L. Randall, Brandon M. Jensen, Gretchen E. Bath, Meghan B. Balling, and Kenneth L. Riley.

The review is classified into the subsections requested by the CIE Performance Work Statement:

4.2.2.1. Comments on the methodology, assumptions, or other factors described within the draft reports to inform siting of aquaculture. Scientific methods soundness, assumptions, and analyses. Justification and interpretation to reach conclusions.

Page 19 (line 7). "*Grid resolution is a balancing act between the coarsest (e.g., bathymetry, oceanographic) and finest (vector data with associated GPS or other error)*"

What does "other error" stand for?

Page 21 (line 20) "*All data were projected and calculations performed using an Albers equal area projection for the Gulf of Mexico …"*.

Check if this is correct and the projection applied for the Southern California Bight should be the same as the one used for the Gulf of Mexico.

Page 25 (line 29) "*A setback of 500-ft (152 m) was applied as fish havens and artificial reefs should be avoided*".

Check the distance adopted as setback. The adoption of such distance maybe requires a citation to other studies analysing the dispersion patterns of organic matter from aquaculture infrastructures. For example, for intensive fish production the amount of organic matter reaching to the seafloor might be significant, and it should be analysed (maybe on a case-by-case basis) if the dispersion rate of the organic matter is enough not to affect the fish havens.

Page 30. Table 2.7 caption. Move to the next page.

Page 31. Table 2.8. "*Deep Sea Coral and Sponge Observations (1985 to present) with 500-m setback*" while a setback of 500 ft is applied for "Hard Bottom Habitat". Why are different setback values applied? I am not an expert on the biological communities of the region, but I would say that it is probable that the hard bottom habitats do contain sensitive species (corals, sponges, etc.). It might have been interesting to apply the same setback value.

Page 31. Table 2.8. For certain features, a setback of 500 ft is used, for others, 500 m.

It is recommended to use the same units of measurement (meters or feet) and to always use the same units for coherence.

Page 31. Table 2.8. A setback of 500 m is applied for oil and gas platforms and pipelines, while a setback of 3 miles is applied for outfall pipes. First, indicate if the units (i.e., miles) are terrestrial or marine. As previously mentioned, it would be preferable to use the same distance units across the various tables.

Page 34. Table 2.10. Some of the activities listed seem to be incompatible with aquaculture activity. Should this not be discussed with the stakeholders?

Page 35. Lines 1-12. Good synthesis of the assumptions and weaknesses when applying the model. The authors acknowledge the implications of the assumptions adopted.

Page 36. Line 15. Delete the last point.

Page 42. “Chl A concentration”, should be Chl a (without capital letter).

RESULTS

Page 43. Line 11. Figure 3.1. Remove the full stop and add the parenthesis.

Page 96. Figure 3.40. “2,000-acre sites” seems to be repeated in the map legend.

Characteristics of AOA Cluster N-1

Page 102. Line 7. Figure 3.53 shows Chlorophyll a concentration and not phytoplankton abundance as stated. Chlorophyll a concentration can be a proxy of phytoplankton abundance, but it is not the same. This point is repeated in all the aquaculture options.

Page 102. Line 8. “Light attenuation characteristics (Figure 3.54)”. I would say that the graph does not show the characteristics but the “mean light attenuation per month”. This is repeated for all the aquaculture options in the subsequent sections.

Page 102. Line 12 “Error! Reference source not found.9”. Check hyperlinks.

Page 102. Line 21 “Reference source not found.0

Page 102. Line 29 “Error! Reference source not found.3).

AOA Option N1-A

Page 116. Line 8 and Line 21. Error! Reference source not found.

Page 117. Line 9. Error! Reference source not found.

AOA Option N1-B

Pages 119 and 120. Error! Reference source not found

There is no line number in these pages and four errors are found.

Page 120. Last line is not finished.

Pages 121. Line 11. Error! Reference source not found.

AOA Option N1-C

Pages 123. Lines 5, 9 and 21. Error! Reference source not found.

Page 124. (Table 3.1010), should be table 3.10.

Characteristics of AOA Cluster N-2

The page numbers are incorrect. It starts on page number 101, and it does not ascend from there. Thus, I have used the page numbers of the pdf file and not the page numbers at the foot of the page.

Page 157. There is no line number.

"*…interactions with natural resources (3.62)*". This should be Table 3.62.

Light attenuation characteristics (Figure 3.68). As commented above, I would state "mean light attenuation per month".

Figures and figure captions are not located properly.

Page 166. Lines 8 and 14. Error! Reference source not found.

Page 166. Line 17. "*Chlorophyll a concentration was lowest in September (1.02)*". Add measurement units (i.e., µg/l).

Page 166. Line 18. *"… was highest in May (0.7/m)*". Add "Kd490 = 0.7/m".

Now again, the page numbering at the foot of the page is correct, so I have now used the page number as indicated at the foot of the page.

Page 140. Figures 3.58 to 3.63 are repeated. There is an editing problem on page 101 and the figures are not located in the correct place.

AOA Option N2-A

Page numbering is incorrect.

Page 180 of the pdf file. Table caption is missing.

Page 182 of the pdf file. Error! Reference source not found.

Page 183 of the pdf file. Error! Reference source not found.

AOA Option N2-B

Page 185 of the pdf file. Table caption is missing.

Page 187 of the pdf file. Table caption is missing.

Page 188 of the pdf file. Error! Reference source not found.

Page 189 of the pdf file. The distances to harbour indicated in Figure 3.70 for option N2-B are not the same as the ones in Table 3.11.

Check this for the rest of the options in N2 and the values provided in Table 3.11.

In fact, Table 3.11 is repeated a number of times and it is not necessary to add it for each of the options, as it covers the characteristics of all options within N2.

AOA Option N2-C

Again, the distances to harbours are correct in the text, but not in the Table 3.11.

Page 192 of the pdf file Error! Reference source not found.

AOA Option N2-D

Same comment regarding distance to port in Table 3.11.

Page 196 of the pdf file Error! Reference source not found.

The same error is repeated in all the options. I am not going to highlight all of them. Check.

Characteristics of AOA Cluster CN-1

Page 172. Line 5. "…interactions with natural resources (3.78)". It is corresponding to Figure 3.78.

Page 172. Line 7. "phytoplankton abundance", should be Chl a concentration.

Page 172. Line 8 "…and light attenuation characteristics (Figure 3.84)." Should read: "light attenuation per month".

Page 174. Line 19. Add Chl a concentration units.

Page 174. Line 20 add “Kd490=0.7/m”.

AOA Option CN1-A

AOA Option CN1-B

Page 193. Figure 3.86 shows option CN1-A and should be CN-B.

Similar Characteristics Across All AOA Options

Page 197. Figure 3.87 is repeated.

Protected Resources

Page 199. Line 12 “…*While the Eastern Pacific gray whale has been removed from the list of threatened and endangered species, the population remains small and critically endangered*”. This statement seems to be contradictory.

4.2.2.2. Data accuracy, quality, appropriateness, and application considered in the spatial analyses. Identification of additional relevant data or information not considered that should have been.

The data used to feed the model is representative of the major administrative boundaries, maritime uses and environmental features.

According to the data description, the authors have used the best available information.

The amount of data sources and information layers that have been collated to be used in the model should be highlighted.

Based on the data sources (mainly derived from official authorities), the quality and accuracy of the data seems to be appropriate for the scope of the analysis.

4.2.2.3. Scientific literature and commercial information adequacy. Assumptions and uncertainties addressed.

The report includes all the relevant scientific literature, technical reports and background documents for the proper definition of AOAs. In particular, the cited scientific literature is relevant and up to date.

In particular, the scientific literature review and citations in the Methods section is very relevant and supports the approach implemented.

The methods and assumptions adopted during the data extraction and during the process of generating the information layers are transparent and the assumptions adopted are reasonable, especially when considering the diverse data sources and nature of the data used. The method is scientifically sound, transparent and could be replicated or customized if necessary.

Data uncertainties are not addressed. But considering the data origin and sources, it is clear that the authors have used the best information available. Especially considering that a number of information layers (particularly the uses and maritime activities) came from official administrations or official data sources, thus, the uncertainty of such data and information layers is inherent to the source of the data and would be out of the scope of the present work.

5. Conclusions and Recommendations

I have read both documents with great interest. Overall, based on the materials I received, I believe that both Atlases are excellent pieces of work.

Both documents are well structured, and the language used is clear and direct. It is written in a way that means it could reach a wide audience, considering that most parts of the report could be easily understood by different stakeholders. This applies particularly to the context and scope of the work, as well as the results and final conclusions. This is an important point to highlight as during the planning process of establishing aquaculture activity, different stakeholders will need to be approached. Both Atlases include technical information that may be used to assist agency decision makers in identifying areas that may be suitable for locating Aquaculture Opportunity Areas (AOAs).

The method implemented is scientifically sound and adequately addresses issues related to identifying AOAs in the framework of ecosystem-based Marine Spatial Planning. The approach implemented is clear and transparent. It applies sound scientific literature to support the methods and the assumptions which needed to be adopted during the production of the models and the production of the final maps. Here, it is important to mention that many different stakeholders have participated in the elaboration of these Atlases, including national and regional government, industry and scientists. Aquaculture sector needs were collected from a series of stakeholder meetings and listening sessions initiated through NOAA's Request for Information (RFI) to solicit public input to help identify project requirements for offshore aquaculture (finfish, macroalgae, shellfish, or a combination of species). Based on information collected through engagement and outreach, study areas were identified and delineated from the AOI for spatial modelling for potential AOAs in federal waters. At this point, it is recommended to include additional information on the number of stakeholders and breadth of stakeholder representation in such meetings, as only the aquaculture sector was specifically mentioned.

An added value of the implemented approach is that the data products will serve not only for aquaculture siting but will also be useful for marine planning in general, and the

identification of areas for development of other activities. This is an important point to highlight for future sector development and conflicts of use avoidance. Nevertheless, it should be taken into account that the Atlases were developed for the specific purpose of preliminarily identifying locations that might be suitable for locating aquaculture activity and includes limitations specific to that purpose. Caution should be exercised when using the Atlases for other purposes.

In addition, there are some recommendations to be considered within the Atlases, which are detailed below.

Aquaculture interactions with the environment could be defined as bidirectional. On the one hand, the environmental conditions define whether aquaculture could be performed, or which kind of aquaculture technique could be established, and also which species could be cultivated. For example, oceanographic conditions could limit the type of aquaculture techniques that could be performed (e.g., wave and wind regimes), and which species could be cultivated according to oceanographic conditions, food availability and water quality. Besides, aquaculture activity could pose environmental risks.

In relation to the environmental conditions for aquaculture activity development, spatial analyses that are specific to specific types of aquaculture and/or cultivation techniques (e.g., macroalgae aquaculture) have not been implemented, which could be of importance for the identification of alternative discrete areas that are more suitable than those proposed by this general analysis. I understand that limitations regarding oceanographic conditions requirements may vary depending on cultivation techniques and species. For example, threshold values for certain oceanographic variables should be identified based on industry criteria or based on scientific literature. This is the case for wind and wave regimes. Nevertheless, this point could be addressed in a second phase of the process when identifying which aquaculture type could be performed at each of the identified sites.

In terms of the environmental effects of aquaculture activity, environmental risks have not been considered at this phase of the aquaculture planning. In relation to the above point, it has to be highlighted that the environmental impacts produced by aquaculture

activity should be assessed by the Programmatic Environmental Impact Statement (PEIS). The PEIS will, therefore, evaluate alternatives and provide robust environmental information to support agency decision making when identifying a location such as an AOA. Such a process will also require performing surveys in the area. For example, the production of high-resolution seafloor maps and benthic habitat maps.

Protected areas have been defined as incompatible with aquaculture. A precautionary approach has been implemented, but this could be further explored within the AOAs. The incompatibility of human activities and uses within protected areas might depend on the protected features (habitats and species), and the activity type. For example, if extensive aquaculture is going to be implemented, the potential environmental impact that it might cause could be low enough not to put at risk the achievement of conservation or restoration objectives, which have been declared in a certain area. There are many cases in which certain aquaculture activities are held within protected areas. For example, intensive finfish production might be incompatible with conservation objectives, but extensive bivalve production or algae production might be compatible with the conservation targets. Nevertheless, considering the size of the area under study, and that the size of the selected sites are big enough for the development of aquaculture activity, it seems that there are no space limitations, and thus it makes it reasonable to apply the precautionary principle of avoiding any kind of protected area as precautionary measure.

It is recommended to check the use of “coastal aquaculture” and “offshore aquaculture” throughout the reports. The general aim of both Atlases states that the objective is the identification of suitable areas for aquaculture, while throughout the reports the term “coastal aquaculture” is used.

Final recommendations are the amendment of minor editing issues and typographical errors throughout both reports, as well as the amendment of the insertion of Figures and Tables in the South California Bight Atlas, check for duplicated Figures and Tables, page numbering and the definition of sections and subsections in the pdf file to facilitate navigation through the document.

In conclusion, the information generated and provided within these Atlases will certainly be of high value to inform agencies prior to embarking on permitting processes, avoiding space-use conflicts, addressing public concerns, and supporting business planning practices.

References

Galparsoro, I., A. Murillas, K. Pinarbasi, A. M. M. Sequeira, V. Stelzenmüller, Á. Borja, A. M. O´Hagan, A. Boyd, S. Bricker, J. M. Garmendia, A. Gimpel, A. Gangnery, S.-L. Billing, Ø. Bergh, Ø. Strand, L. Hiu, B. Fragoso, J. Icely, J. Ren, N. Papageorgiou, J. Grant, D. Brigolin, R. Pastres, P. Tett, 2020. Global stakeholder vision for ecosystem-based marine aquaculture expansion from coastal to offshore areas. Reviews in Aquaculture, 12: 2061-2079.

FAO Technical Guidelines for Responsible Fisheries 5 Suppl. 4. AQUACULTURE DEVELOPMENT. 4. Ecosystem approach to aquaculture. (http://www.fao.org/3/i1750e/i1750e00.htm).

Gimpel, A., V. Stelzenmüller, S. Töpsch, I. Galparsoro, M. Gubbins, D. Miller, A. Murillas, A. G. Murray, K. Pınarbaşı, G. Roca, R. Watret, 2018. A GIS-based tool for an integrated assessment of spatial planning trade-offs with aquaculture. Science of The Total Environment, 627: 1644–1655.

Pınarbaşı, K., I. Galparsoro, Á. Borja, V. Stelzenmüller, C. N. Ehler, A. Gimpel, 2017. Decision support tools in marine spatial planning: Present applications, gaps and future perspectives. Marine Policy, 83: 83-91.

Pınarbaşı, K., I. Galparsoro, D. Depellegrin, J. Bald, G. Perez-Moran, A. Borja, 2019. A modelling approach for offshore wind farm feasibility with respect to ecosystem-based marine spatial planning. Sci Total Environ, 667: 306-317.

Appendix 1: CIE Performance Work Statement

Performance Work Statement

National Oceanic and Atmospheric Administration (NOAA)

National Marine Fisheries Service

Center for Independent Experts (CIE) Program

External Independent Peer Review

Review of Aquaculture Opportunity Areas Atlases

for the Gulf of Mexico and Southern California

Background

NOAA is mandated by the Information Quality Act, as well as the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NOAA science products, including scientific advice, can be 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 fishery 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, 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[1]. Further information on the Center for Independent Experts (CIE) program may be obtained from www.ciereviews.org.

Scope

NOAA has directives to preserve ocean sustainability and facilitate domestic aquaculture in the United States. Amid the COVID-19 global pandemic, the U.S. developed several policies and plans to bolster the domestic supply of seafood and address concerns about food security.

[1] http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf

Among the most notable of these policies was the issuance of an Executive Order (EO) on Promoting American Seafood Competitiveness and Economic Growth, which offers a particular focus on spatial planning for Aquaculture Opportunity Areas (AOA) to support aquaculture development. An AOA is a small defined geographic area that has been evaluated to determine its potential suitability for commercial aquaculture. Two spatial analyses were developed for the Gulf of Mexico and Southern California for use by the National Marine Fisheries Service (NMFS) and other coastal managers to inform development of AOAs in federal waters. The results of the spatial analyses are provided in the form of "atlases" that comprise modeling methods, results, maps, and other descriptive information to inform the AOA development process. These analyses were developed by the NOAA National Centers for Coastal Ocean Science (NCCOS) in partnership with the NMFS, and in coordination with cooperating federal and state agencies, Regional Fishery Management Councils, and State and tribal governments.

The spatial analyses utilize the largest and most comprehensive datasets available for spatial planning for aquaculture in coastal ocean waters of the U.S. EEZ. These data were compiled through mining of existing data within NOAA and various partners' geodatabases including the regional ocean portals, marinecadastre.gov, and acquisition through individual requests to various government, industry, and environmental entities. With over 200 datasets per region, the spatial analyses identify multiple study areas that were informed directly by the aquaculture industry. A 10-acre spatial resolution grid was used for each study area to model aquaculture suitability, ultimately providing a relative suitability score for each grid cell. Standard approaches in Geographic Information Systems (GIS) analyses were used to develop scoring and modeling methods including Multi-criteria Decision-making Analysis (MCDA), Fuzzy Logic Membership Functions, and Logic Index of Spatial Association (LISA) and cluster analyses.

The outcome of this analysis, along with other information including public input will be used to inform an Programmatic Environmental Impact Statement (PEIS) under the National Environmental Policy Act (NEPA) to determine the probable level of impact associated with development of Aquaculture Opportunity Areas.

Given the importance and magnitude of the AOAs effort, it is important that science used to inform identification represent the best available science. Therefore, the CIE reviewers will conduct a peer review of the scientific information contained within the AOA Atlases based on the Terms of Reference (TORs) referenced below. Given the public interest, it will be important for NOAA to have a transparent and independent review process of the spatial analysis and approach 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

NOAA requires three reviewers to conduct an impartial and independent peer review in accordance with this Performance Work Statement (PWS), OMB Guidelines, and the ToRs below. The reviewers shall have working knowledge and recent experience in **marine spatial**

analysis (e.g., multicriteria analysis, suitability modeling, spatial statistics) with applications to general ocean industry planning, preferably with experience applying analyses towards government or industry applications and with specific expertise in aquaculture. Each CIE reviewer's duties shall not exceed a maximum of 10 days to complete all work tasks of the peer review described herein.

Tasks for reviewers

Each CIE reviewers shall complete the following tasks in accordance with the PWS and Schedule of Milestones and Deliverables herein.

1. Pre-review Background Documents: Review the following background materials and reports prior to the review:

Four weeks before the peer review, the Project Contacts will send by electronic mail or make available at an FTP site to the CIE reviewer all necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NOAA Project Contact will consult with the CIE on where to send documents. The CIE reviewer shall read all documents in preparation for the peer review, for example:

Exec. Order No. 13921, 85 Fed. Reg. 28471 (May 7, 2020). Available at:

https://www.federalregister.gov/documents/2020/05/12/2020-10315/promoting-american-seafood-competitiveness-and-economic-growth

Aquaculture Opportunity Areas, NOAA Fisheries. Available at: https://www.fisheries.noaa.gov/aquaculture-opportunity-areas

Aquaculture Opportunity Areas 2020. Docket ID: NOAA-NMFS-2020-0118. Request for Public Input. Available at: https://www.regulations.gov/docket?D=NOAA-NMFS-2020-0118

2. Webinar: Additionally, approximately two weeks prior to the peer review, the CIE reviewers will participate in a webinar with the Project Contacts and other staff to address any clarifications that the reviewers may have regarding the ToRs or the review process. The Project Contacts will provide the information for the arrangements for this webinar.

3. 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 Contracting Officer's Representative (COR) and the CIE contractor.

4. Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the PWS. Each CIE reviewer shall complete the independent peer review according to 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.

5. Deliver their reports to the Government according to the specified milestone 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 July 2021. Each reviewer's 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
Two weeks prior to the review	Contractor provides the pre-review documents to the reviewers. Reviewers participate in Webinar.
August 2021	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 (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.

Project Contacts

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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 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 documents:

An Aquaculture Opportunity Atlas for Southern California. *Full reference to be provided.*

An Aquaculture Opportunity Atlas for the Gulf of Mexico. *Full reference to be provided.*

We request comments for all areas described below to be provided in tabular format, including: line number(s), comment type (i.e., data source/references, methods, assumptions/interpretation, results/conclusions, other).

1. Please provide comments on the methodology, assumptions, or other factors described within the draft reports to inform siting of aquaculture. Are the scientific methods sound, the assumptions reasonable, and analyses logical? If you find that justification is lacking or specific information was applied incorrectly in reaching conclusions, please specify in your comments.
2. Please consider the accuracy, quality, appropriateness, and application of data considered in the spatial analyses. If any additional relevant data or information exists that was not considered and should have been, please specify in your comments.
3. In general, does the draft report include and cite the best scientific and commercial information available? Are assumptions and uncertainties addressed fairly and clearly, where appropriate? If not, please explain.
4. To the extent possible, you are asked to limit your review to the topics and questions listed above regarding the use and interpretation of the best available data, rather than address any legal or policy matters.