Response to Referee 1

Dear Professor Pringle:
Thank you very much for your careful review and valuable comments. We have studied your comments carefully and tried our best to revise the manuscript. The point to point responses to your comments are listed as following:

Question 1.
Page 8, Line 18-20: The modified sentence is still not really correct. Please change to something like: "FVCOM uses terrain-following vertical sigma coordinates that has the capacity to solve the flow over complex bathymetric conditions (Chen et al., 2006)." (Do not need the Haney (1990) reference)

Response 1: Thank you for your kind suggestion. We have corrected the cited reference in the manuscript.
The application of terrain-following coordinates results in an improved capacity to solve complex bathymetric conditions (Chen et al., 2006b).

Thank you for your evaluation of the manuscript.

The authors would like to revise this manuscript if reviewers have any other questions.
Sincerely
authors

Response to Referee #2

Dear Reviewer:

Thank you very much for your careful review and valuable comments. We have studied your comments carefully and tried our best to revise the manuscript. The point to point responses to your comments are listed as following:

Introduction:

1/ On the salinity boundary condition: 34 PSU at surface at 32 PSU at depth? I would have expected the opposite -- estuarine flow is usually characterised by salty flow at depth and fresher flow at the surface -- so 32 at surface at 34 at depth. Given the constant temperature, does the higher-salinity above lower-salinity water lead to unstable stratification?

Response 1: Thank you for your correction, we made a mistake in proofreading the manuscript. The open boundary condition for salinity should be 32 PSU at the sea surface and interpolated between 32 and 34 PSU from the surface to the bottom. The water depth in the study area is shallow, and there is no obvious stratification of water temperature, so we give a constant value in these simulations.

2/ On the river discharges. The authors present two discharge scenarios (high flow season and low flow season) for both pre-port and post-port domains. To me, the 1995 version represents a baseline salinity regime that the vegetation is compatible with -- it survives both seasons, perhaps thriving in one and tolerating the other. The suite of experiments does not take into account the decrease in freshwater discharge due to recent diversions for use by the population. That is, there should be a low flow 1995 scenario contrasted with a low-flow 2019 scenario where the low-flows are adjusted for the diversions. The manuscript would benefit from drawing attention to the fact that this comparison was not done (perhaps saving it for future work to be done alongside adding surface forcing).

Response: Thank you for your kind suggestion. We have made a comparison of salinity calculated in low flow 1995 scenario and low flow 2019 scenario in Figure 12 (a) and (c), in Section 4.2.

Meanwhile, the speculation in section 4.1 about higher salinity as a consequence of increased water use seems to have been promoted to become part of the conclusions in section 5 ("Once the port was constructed, its obstruction of the port area strengthened the tidal current mixing, and the partial runoff from the Daliao River was diverted. As a result, the fresh water dilution effect further weakened, thus increasing the salinity of the sea water in the lower reaches of the Pink Beach Wetland."). The latter part wasn't shown, so the conclusions needs to be adjusted here.

Response: We have added description about the conclusion from Section 5 in Section 4.3, as a supplementary discussion about salinity increase in Section 4.2. Conclusions in Section 5 have also been adjusted accordingly.

2b/ Also regarding Table 1: are the high/low flow season discharges from 1995 (pre-port and pre-diversions) or from 2019 (post-port and post-diversions)?

Response 2b: We adopted a multi-year mean river discharge as a normal mean value (the high one), then we hypothetically set the low discharge values of both rivers to reflect a sharply reduced river discharge scenario.

We sincerely appreciate your kind suggestions and corrections on our manuscript. The authors would like to revise this manuscript if reviewers have any other questions.
Sincerely
authors

Response to Referee #3

Dear Reviewer:

Thank you very much for your careful review and valuable comments. We have studied your comments carefully and tried our best to revise the manuscript. The point to point responses to your comments are listed as following:

Introduction

Question 2

The authors answered "We applied FVCOM instead MIKE 21 model because we want to investigate the three-dimensional distribution of salinity in the LRE." I do not understand: do thay mean that MIKE21 does not enable 3D studies? The authors add "In mike model, Qiao et al. discussed the influence of runoff decrease on salt intrusion", so I am a little confused.

Response: Sorry for the inappropriate reply. The MIKE 21 model utilizes two-dimensional shallow water equations and simulates water level variation and flow with depth-averaged unsteady two-dimensional free-surface flows within the study area. FVCOM module is an unstructured grid, finite-volume, three-dimensional, primitive equations coastal ocean model, which was originally developed by Chen et al. (2003). It has been widely applied for researches in large lakes, estuarine regions, and regional ocean areas. In this study, we use this 3D model to investigate the three-dimensional distribution of salinity in the LRE.

Model description

Question 1

I am still frustrated with the model description, and I do not find any mention of the use of primitive equations. I suggest the author consider the following description:

Page 8 Line 12.

"It is a three-dimensional ocean model (Chen et al. 2003, http://fvcom.smast.umassd.edu/fvcom) based on primitive equation and using the finite volume method with the capability to deal with horizontal unstructured triangular cells, which is well fitted to irregular coastline."

Response: Thank you for your suggestion, we have modified the model description using your sentence.

Model configuration

Question 1

The authors partially answered the question. They tackled the issue of initial and boundary variables values but they did not add the description of open boundary conditions. FVCOM offers the choice between different OBC schemes. For the elevation, did the authors use Orlansky conditions? Radiative GWI? What about the heat and momentum OBC?

Response: Thank you for your reminding. We have added OBC schemes in the Model configuration: The open boundary condition for surface elevation was original FVCOM setup (ASL) and that for the perturbation of salinity and temperature was Blumberg and Khanta (BKI) condition (Blumberg and Kantha, 1985). No surface heat flux was considered in this paper.

Question 5

Your answer mentions some additional explanations. I was not able to find them in the text, nothing was added in that paragraph. Please help the reviewer in finding them.

Response: Sorry for the negligence in proofreading the manuscript. We have added additional explanation: the velocity in the open cell is computed using the linear or nonlinear momentum equations.

Results and discussion

Question2

Figure 14 is a zoom of Figure 15, it represents a great improvement but it is still not easy to handle. You should definitely put less arrows but enlarge them.

Response: We follow your suggestion and made some little adjustments, Figure 14 have been redrawn.

Question 4

If your focus is mainly on residual flow, then you should not put a summary on salinity results.

Response: Thank you for your suggestion. We have adjusted description in Section 4.3, trying to illustrate the reason for salinity increase in downstream of Pink Beach Wetland via residual flow analysis.

Figures

Figure 6 looks the same than before

Response: We have redrawn Figure 6.

Minor corrections and typos:

Page 8 Line 4: Split this long sentence into two sentences, replace with "semidiurnal tide. In addition,…".

Page 8 Line 19. Split into two sentences, replace with "(Chen et al., 2006). The application…"

Page 9 Line 14: replace with "of the LRE that we measured".

Page 9 Line 22: remove "Model", and replace "zero velocity" with "ocean at rest, zero velocity".

Page 20 Line 17: the doi link does not work for Chen et al. (2003), replace with a valid one.

Page 12 Line 6: there is a problem with the sentence beginning with "Where". Please correct.

Page 19 Line 11: "differs"

Response: Sincerely thank you for your corrections. We have revised sentences and typos follow your suggetions.

Thank you for your evaluation of the manuscript.

The authors would like to revise this manuscript if reviewers have any other questions.

Sincerely

authors