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| **[External Email]** |

Bill,

Consider this a 1st-read review with suggestions.  Most are my personal opinions I hope you will consider and I hope you find helpful.

Minor Style comments:

I never write in 1st person anymore as most of the editors I encounter prefer it is not.  I added some suggested changes early, but didn’t highlight all.

Thanks. I like to write in first person and have recently published in that voice via a “perspectives” piece in Marine and Coastal Fisheries. Maybe we try that with this article too.

Along the same lines, some of the paragraphs come across as very judgemental, my personal opinion, I would try be to be less pointed and try to focus on pointing out the many uncertainties that remain .  It’s also fine to point out things we know don’t work, though I am not sure we have any I would feel certain about.

I can see that. But I also think there is some outrage to capture related to how ineffective these restoration programs have been.

Flow: While flow is important, salinity is what drives oyster biology.  I doubt we have the data needed to really asses reef-specific performance but I suspect it matters.

I’ve worked with the continuous data that are collected at a few NERRS stations. And salinity estimates accompany the count data (point in time samples). But the restoration sites don’t have companion salinity sensors. I’ve looked at the discharge-landings and discharge fisheries independent data and don’t see strong relationships. Lags may be important, but I don’t see anything super strong. It may be because the stocks are so degraded that they are no longer responding in a “normal” way.

I don’t have an easy answer to suggest.  In Apalachicola there’s probably a predictable relationship and enough data to look at project and salinity based on flow data.

I have only looked at discharge, where as flow includes timing, duration, and magnitude of discharge. So if you have other metrics such as timing let me know.

  I suspect there are differences in the projects, maybe not huge but I bet it would describe some of the variance.  In Pensacola, there are three rivers, not two, and their flow affects the east and west portion of the bay differently, unless Escambia flow is huge, which happens, then the whole system can go below 10 ppt.

Yes, the system can go below 10. But I don’t think that happens regularly and I couldn’t find any continuous data.

In St. Andrew, while there isn’t a major source of FW, combined flow from the dam ( I forget it’s name), the watershed, and the canal into West Bay can and do result in salinities well below 10 north of the Hathaway bridge.  The low-salinity periods typically do not persist as long as other estuaries but do occur.

I was just going from NWFWMD reports. I have a sturgeon project on the Choctawhatchee now so we are on the river 3-4 months a year. The dam you speak of is Deer Point Lake I think. The discharge is tiny, a 10’s to a few hundred CFS.

 My suggestion would be to incorporate salinity if possible.  At minimum I would also examine the number of days the flow to Apalachicola  was at 5000 cfs, because that is the current managed minimum flow.

I would, but other than the NERRS data, don’t really have a framework. And the NERRS data are highly correlated with river discharge.

Spat/Sublegal/Legal: while I understand some of the data is only available in bins, I still suspect the huge events noted in time period 2,4,and 6 probably represent true spat (<5-10 mm) and not juveniles.

Yes, that’s why I keep the data in the bins or calculate the counts to fit into these bins. Most of those spat are about 5-10mm yes.

  I don’t have an easy answer to what I’d do differently, but that data is so extreme it has to affect estimates of abundance and the shape of the curves.

It does, and that is accounted for in the dispersion factor. The models aren’t great fit, but, they do a pretty good job. I had to flip to TMB to get convergence, and the dispersion factors are high, but they fit. I can do a type of power analyses to check convergence too.

Not my area of expertise but some of the analyses I’ve seen lately suggest an analyst should use extreme caution and have an intimate understanding of data sets before combining.

Agree. I’ve done everything I can to be familiar with the datasets. I have an extensive history of work in AB and have spent a lot of time with FDEP staff on this. I’ve reviewed the FDEP and FWC reports. And I wrote the propoal for NFWF. I’ve offered a couple of times to meet with FWC staff in Apalach without response.

I’m not sure it’s possible.  Unfortunately, I’m also not sure there sufficient data to look at trends without combining data sets.   So I don’t have great recommendations for how to do this.

As you can see I also do the analyses “by project”. So those are just raw data plots. Which suggest limited to no response in the most recent years.

Time periods: My feeling is the analysis of time-since-cultching is probably more important.  I don’t fully understand the analyses as written based on time period -vs- time-since-cultch nor why the analyses cannot just use month and months-since-cultching instead of creating a categorical summer/winter variable.

I think others in FWC share this same opinion, but I don’t understand why. I would like to talk more about this. It seems the goal is to grow legal oysters, not just spat.

Cultching: there is in fact data on clutching from 1970-2009 in the GSMFC report.  There is some data available from prior to 1970 suggesting FL has culched as long as FL has had an oyster industry.

Yes, I touched on this in the 2015 “Curious Case” paper, but I don’t have live oyster counts from the older time periods. I have some other things I’m working on related to shell removals vs. cultching effort. I’ll share them with you when I have finished.

  In the early 1900’s, this would have been primarily a requirement that leases add cultch, but last time I asked Portia could not locate those records.  It is entirely possibly the switch to fossil shell and then limestone is not working as well as processed shell, dredged oyster, or dredged clam.   I just don’t feel this is examined nor the history of clutching in the analyses as written. One possibility is that part of what is required for a fishery is consistent clutching.

I think for the fishery to be sustainable you can’t be in a negative shell budget.

Time frame: as written the analyses cover about five years.

Those are all the data we have.

  ENSO and NAO cycles take 5-7 years and are a known if poorly understood process affecting oysters (disease and predation). To really evaluate, we need two cycles , 10-14 years.  Some of the projects in this paper are only a year old.  And one, I’m not sure which, did not collect data in year 1 post-plant.  I know we want guidance now, but I would suggest designing substrate experiments on an appropriate scale, 10’s of acres each?, with a time frame of at least five years in mind. Preferably 10-15.

We can’t do that if the lifecycle of the funding is 15 years and we are supposed to follow an adaptive management framework. I wrote about that here

https://afspubs.onlinelibrary.wiley.com/doi/pdf/10.1002/mcf2.10192

  Not ideal.   That being said, would it be possible to gather better, more specific  data on projects that have occurred. I don’t know, but we do have a decent 50-year record of cultching that it might be possible?

I think this is a great idea. FWC staff recommend in their NFWF reports to follow the “Kimbro” guidelines for cultching. Ok great. But why not go back to the Kimbro reefs built in 2015 or so and see how they are doing 7 years later. If they are not performing any better than any other built reef then that might not be a good idea.

Always willing to discuss any of these comments.

I can’t thank you enough for your comments and time. I will send you a revised copy after I meet with folks next week.

S

Stephen P Geiger

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**From:** Pine, Bill <[billpine@ufl.edu](mailto:billpine@ufl.edu)>   
**Sent:** Tuesday, May 10, 2022 10:14 AM  
**To:** Geiger, Steve <[Stephen.Geiger@MyFWC.com](mailto:Stephen.Geiger@MyFWC.com)>  
**Subject:** FW: updated paper

**[EXTERNAL SENDER]** Use Caution opening links or attachments

FYI, I sent this out a few weeks ago but I’ve not heard anything from anyone. Jim Estes asked me to take a look at these data.

**From:** Pine, Bill   
**Sent:** Wednesday, April 20, 2022 11:03 AM  
**To:** Allen,Micheal S <[msal@ufl.edu](mailto:msal@ufl.edu)>; Resko, Devin <[Devin.Resko@MyFWC.com](mailto:Devin.Resko@MyFWC.com)>; Camp, Ed <[edvcamp@ufl.edu](mailto:edvcamp@ufl.edu)>; Jennifer F Moore ([jennmoore924@ufl.edu](mailto:jennmoore924@ufl.edu)) <[jennmoore924@ufl.edu](mailto:jennmoore924@ufl.edu)>; Casteel,Jamie L <[casteelj@ufl.edu](mailto:casteelj@ufl.edu)>; Brucker, Jonathan <[Jonathan.Brucker@dep.state.fl.us](mailto:Jonathan.Brucker@dep.state.fl.us)>; [Katie.Konchar@MyFWC.com](mailto:Katie.Konchar@MyFWC.com); Davis, Matthew <[Matthew.Davis@MyFWC.com](mailto:Matthew.Davis@MyFWC.com)>; Scholze, Tomena <[Tomena.Scholze@MyFWC.com](mailto:Tomena.Scholze@MyFWC.com)>; Gandy, Ryan <[ryan.gandy@myfwc.com](mailto:ryan.gandy@myfwc.com)>; Sandra Brooke <[sbrooke@fsu.edu](mailto:sbrooke@fsu.edu)>; Joel Trexler <[jtrexler@fsu.edu](mailto:jtrexler@fsu.edu)>; Harper, Jennifer <[Jennifer.Harper@dep.state.fl.us](mailto:Jennifer.Harper@dep.state.fl.us)>; David Reeves <[David.Reeves@NFWF.ORG](mailto:David.Reeves@NFWF.ORG)>; Jonathan Porthouse <[Jonathan.Porthouse@nfwf.org](mailto:Jonathan.Porthouse@nfwf.org)>; Johnson,Fred Allen <[fjohn@ufl.edu](mailto:fjohn@ufl.edu)>  
**Subject:** updated paper

Hi,

Attached is an updated draft of the oyster trend paper I’ve been working on for systems in the panhandle. I’m going to have to set this aside for a little, but I wanted to get something to you to at least flip through in case we have a meeting in the next few weeks.

The repo is here

[https://github.com/billpine/AB\_DEP.git](https://urldefense.proofpoint.com/v2/url?u=https-3A__github.com_billpine_AB-5FDEP.git&d=DwMFAg&c=sJ6xIWYx-zLMB3EPkvcnVg&r=0N2A3Co00ZnRVDd_w9mp4WxhJElmuTyPkEl1edjtgCg&m=YnSuMIxsIF9heT5vgUxA84azdo5ZSO90XE4cl2vHXHdSu0m80J592RsI2thQLWV_&s=0Ml-yzgK8G97qZITk4X-jBgz_sEDC4uS8oL5rx0O03g&e=)

Jonathan sent additional data this morning from St. Andrews Bay and they are also sampling Pensacola in a few weeks.  We can update this paper with those data at some point as well.  FWC also has some St. Andrews data but I’m not cleaned and standardized those data to incorporate yet.

Thanks,

bp