**Review of the Atlantis Ecosystem Model in Support of Ecosystem-Based Fishery Management in the Gulf of Mexico Large Marine Ecosystem**

March 28 – March 30, 2023

Florida Fish and Wildlife Research Institute

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**Tuesday March 28th, 2023**

*Day 1 Goals: Overview of the Gulf of Mexico Model Configuration and applications (2015 NOAA Tech Memo and peer-reviewed literature)*

9:00-9:20 am Introductions, [TORs,](https://docs.google.com/document/d/1dbQTruxlxtaE_QnTVycFw7CwWcUDv8HvBYDO9G6nCQ4/edit) [roles and rules](https://docs.google.com/document/d/1vjlfPjCP7NKNwQahzv2TVkcm_nLipW0dpQaMJ7g3HcA/edit) review (Matt Freeman)

9:20-9:30 am Aims of the modeling effort: [project overview & the intended simulation/strategic application of the model post-CIE review](https://docs.google.com/presentation/d/1irjvzFxMOFHNMbcndt81hqRrdJc6IntN/edit?usp=share_link&ouid=118344647712271422710&rtpof=true&sd=true) (Michelle Masi)

9:30-9:50 am [CIE review recap of the NWFSC Atlantis Model](https://docs.google.com/presentation/d/13IURud3QnAY0sI7ghRcNeVEXZIdKRWWpMuBlll5QaHw/edit?usp=sharing), and overview of why we elected to hone in on subset of species (Isaac Kaplan)

9:50-10:05 am [How the southeast region is building ecosystem modeling capacity](https://docs.google.com/presentation/d/1op_h7z6e3P3IsVBB41CXiaJQ5-7rbG8v/edit?usp=share_link&ouid=111534859063080409824&rtpof=true&sd=true) to better address strategic management priorities (Mandy Karnauskas)

Break 25 mins

10:30-12 pm [Atlantis End-to-End Model](https://research.csiro.au/atlantis/) (TOR 1.a,b,c,d) [[Dr Ainsworth’s ppt here](https://docs.google.com/presentation/d/1tJ2QRPM0P19aBiZxrr_1ohIWobCo7szU/edit?usp=drive_web&ouid=118344647712271422710&rtpof=true)]

* The Atlantis Approach ([General references](https://drive.google.com/drive/folders/1MwG2F9P8fuoahM9f6dwDcRn3i6rkulH9?usp=share_link))
* CSIRO & world community

GOM Atlantis model

* [GOM Atlantis Model Tech Memo (2015)](https://docs.google.com/document/d/1cKU7o_hCb47yitlR3vxvQC6bnXAMngAu/edit?usp=share_link&ouid=118344647712271422710&rtpof=true&sd=true) (TOR 1.a,b) Fitting (TOR 1.g)
* [GOM Atlantis Tech Memo (Draft](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.27rdt8rmpamx))
  + With updates to Feb 2023 (TOR 1.a,b)
  + TOR 1.a, 2.a: Data refinements and parameterization
* [Hydrodynamic forcing data](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#heading=h.bn9515qkwpm)
* Biomass of species
* [GOM Atlantis fisheries, high-level overview](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.881gjp80ibu6)
  + [Fleet structure](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.2ppzhppyqecd)
* [Migration](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#heading=h.1ksv4uv)
* [Statistical habitat effects](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.yh2ulul4mo9b)Spatial distribution of species
  + 40 fish & invertebrate groups ([Drexler and Ainsworth 2013](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0064458))
  + Pink shrimp PSH ([Gruss et al. 2014](https://www.researchgate.net/publication/262920307_Using_delta_generalized_additive_models_to_produce_distribution_maps_for_spatially_explicit_ecosystem_models))
  + 61 fish & invertebrate groups [(Gruss et al. 2018b)](https://drive.google.com/file/d/1Venb_4NW35NRW9UHgqUEaS0IifX3xV2L/view?usp=share_link)
  + 32 fish & invertebrate groups [(Gruss et al. 2018a.)](https://drive.google.com/file/d/1nVHUnN8uSzvqBxu4CYO_jHc-f4S3Z-8M/view?usp=share_link)
  + 2 bird groups DBR SBR [(Gruss et al. 2019)](https://drive.google.com/file/d/14L2Dpd7pAlguvzY6Y_7tx4VI1B1v3JEp/view?usp=share_link)
  + 2 marine mammals and 2 sea turtles [(Gruss et al. 2018c.)](https://drive.google.com/file/d/10iVqs6x20VGIpgcYAE2hZTwQjRvKIXTx/view?usp=share_link)
  + 2 sea turtle (ICHTHYOP) (Scott et al. *in prep*)
* [Predator-prey dynamics](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#heading=h.lqvu2t4hse5j)
  + [Food web diagram](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.nj7cgq4kbn61)
  + Dirichlet model ([Masi et al. 2014](https://www.sciencedirect.com/science/article/pii/S0304380014001860))
  + Improved Western GOM diet data [(Tarnecki et al. 2016)](https://drive.google.com/file/d/1hYsK6bidltn9a1uht03E777A68xIw5N_/view?usp=share_link)
  + Diet uncertainty in simulations ([Morzaria-Luna et al. 2022](https://drive.google.com/file/d/1CBpX4-xHBz6TrqwBdugrmvgEielv7HUV/view?usp=sharing))
  + Improving pelagic interactions (Scott et al. *in prep*)

Lunch 1 hour

1:00-1:45 Additional applications of the methodology (TOR 1.b )

* [Effects of the Deepwater Horizon Oil Spill on Human Communities: Catch and Economic Impacts (Court et al. 2020)](https://drive.google.com/file/d/1RPD50iU6S85y5g945HSD3FeTLBd6mstL/view?usp=sharing)

GOM model applications (TOR # 1.b, 1.e, 1.f, 1.g)

* Oil fate model coupling [(Ainsworth et al. 2017)](https://drive.google.com/file/d/1Y_kZH086KH37l1iX9Nhxuitd2f4V6IrA/view?usp=share_link)
  + Uncertainty (TOR 1.f)
* [Impacts of deep-water spills on mesopelagic communities and implications for the wider pelagic food web (Morzaria Luna et al. 2022)](https://drive.google.com/file/d/1CBpX4-xHBz6TrqwBdugrmvgEielv7HUV/view?usp=sharing)
* Ecological indicators [(Masi et al. 2017)](https://drive.google.com/file/d/1JL4cMDWFzaUf6Rn4kEicZvf00srgJflg/view?usp=share_link)
* Management Strategy Evaluation [(Masi et al. 2018)](https://drive.google.com/file/d/1z-oWEhXzL_i9XFPpji3tFPng2R59HQkr/view?usp=share_link)

Break 30 min

2:15 - 3:30 GOM Atlantis model updates to improve representation of environmental processes that drive the distribution and abundance of shrimp, and may be impacted under a changing climate (TOR # 2.b, c. and d.)

* Larval dispersal (Kelly Vasbinder UC Santa Cruz); Hydrodynamics ; Vertical migration behavior
* Nutrient & Detritus cycles (e.g., [Dornberger et al. 2022](https://www.sciencedirect.com/science/article/pii/S0269749122016645#!))
* Seagrass routine affect carrying capacity
* Habitat affinity statistical model (in prep)

3:30 - 4:30 Public comment / discussion

**Wednesday March 29th, 2023**

*Day 2 Goals: Overview of GOM Atlantis model updates (New NOAA Tech Memo) and improvements, focused on Penaeid shrimp and their top 10 major interacting species*

9:00 - 9:30 [Shrimp biology/ecology overview](https://docs.google.com/presentation/d/1XdTf2fWwMT8KtzckdXwqwqUXDHtkcB22/edit?usp=share_link&ouid=118344647712271422710&rtpof=true&sd=true) (Michelle Masi, for Jen Leo)

9:30-10:15 GOM Atlantis model tuning and diagnostics regarding Penaeids and their major interacting species groups (TOR #2.a)

* + - * [Population dynamics](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.up964p7defha)
      * [Life history and ecology](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.i0th44sojhr2)

Break 30 mins

10:45 - 12:30 GOM Atlantis model tuning and diagnostics regarding Penaeids and their major interacting species groups (continued) (TOR #2.a)

[Penaeid shrimp fisheries representation, particularly as compared to Southeast Data, Assessment and Review (SEDAR) reports]

* + - * [Updates and improvements to GOM Atlantis Model fisheries](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.881gjp80ibu6)
      * [Landings and discards](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.rcd902cl69r3)
        + Bycatch adjustments, following internal panel recommendations

[Dead discard setup: US otter trawl fishery](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.3kli4s8dg3ao)

[Dead discard setup: US recreational fishing](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.3v9dfqsf9k8p)

* + - * + [Summary of simulated US catches and fishing mortalities](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.3rpb7p213lmu) (Atlantis vs SEDAR)

Lunch 30 mins

1:00 - 2:00 [Model sensitivity for penaeids and focal groups](https://drive.google.com/drive/folders/19sXNIHYNflMYGF759NSkPYsJOXGkKfrK?usp=sharing) (TOR 2.a, TOR 1.e, 1.g)

* + - * [Productivity for Penaeids](https://docs.google.com/document/d/153hIvn_uA309zLEeWIE7hfGJQaYzmXoX/edit#bookmark=id.lf2h0agen48y) - estimates of shrimp MSY and FMSY from a selection of GOM EwE models
      * Equilibrium state under no fishing pressure?
      * Penaeid sensitivity to food availability

Break 30 mins

2:30-3:30 [Handling of uncertainty](https://drive.google.com/drive/folders/1gwDl7gAGSKHiVfi7B34YnRNBnEOmBsQ5?usp=sharing) (Cameron Ainsworth/Holly Perryman) (TOR 2.a-.c, TOR 2.f)

* + - * Diet composition uncertainty determines impacts on fisheries following an oil spill [(Morzaria-Luna et al. 2018)](https://drive.google.com/file/d/1lCt4H_-q6bURoo7JYm2V_H6gACox0iVV/view?usp=share_link)
      * Bounded scenarios
        + uncertainty in initial penaeid shrimp biomass estimates
        + uncertainty in seagrass coverage

Is shrimp abundance/distribution altered under these scenarios?

* + - * + uncertainty in rate parameters

Temperature impacts on recruitment and movement

3:30-4:30 Public comment / discussion

**Thurs, March 30th, 2023**

*Day 3 Goals: Initiate peer review report writing and ensure that the reviewers have all necessary materials to complete the review.*

9:00-10:30 CIE Panel Discussion and Q&As

discussion: extra time to discuss any diagnostic material

10:30-12:00 Panel deliberation and Report writing

Lunch 1 hour

1:00-2:30 Additional deliberation & closeout