# WGSAM Skill Assessment Project

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## 2021-03-09

Webinar: JOIN WEBEX MEETING <https://noaanmfs-meets.webex.com/noaanmfs-meets/j.php?MTID=meb572dfb51d1a997696814174e16dd9a>

Meeting number (access code): 199 691 7537

Meeting password: iE6J9pJGBu3

Attendees:

Sean Lucey, Noel Holmgren, Rob Gamble, Daniel Howell,

Sarah Gaichas

Isaac Kaplan

Grant Adams

Vanessa Trijoulet

Bjarki

Alfonso Perez-Rodriguez

Agenda:

1. Review NOBA Atlantis runs completed
   1. I’m checking the last things in the simulation with the selectivity turned on for all the fleets that were discussed at the last meeting, and
   2. finally managed to turn on the ANNAGE files again
2. Outline baseline scenario--keep initial simple. No climate in the run.
   1. Fits for each model \*and\* for an ensemble within/among the models
      1. R package in development for ensemble
      2. Models don’t necessarily have to estimate exactly the same things
   2. Proposal 1: compare historical fits only for all species
      1. Biomass and fishing mortality; terminal year and full time series
      2. Estimate reference points--define or let each modeler decide?
         1. Difficult to agree on how to do multispecies or ecosystem reference points
            1. Ensure that projection assumptions are similar
            2. Not all models have reference point code available
         2. Estimation of single species reference points more standardized, but may not match expectations from multispecies and ecosystem
         3. What is the reference point in Atlantis? Does it exist?
            1. Yes we can calculate reference points in Atlantis --such as Bo , Msy, and Fmsy .
            2. They are not input parameters in Atlantis , but they can be calculated, given assumptions (easy with constant climate, stabilizing other stocks in terms of F)
            3. Catch advice and management performance are probably of more interest than the reference points values from the truth, especially given methodological differences in calculating ref points
      3. Alternative, have a constant set of assumptions for short term projection parameters (n years, M, F average of last 5 years, etc). Can then compare relative SSB, F, B0 out of all models. This avoids the complication of defining and standardizing multispecies reference points
      4. Current status with respect to reference points
   3. Proposal 2: compare historical fits and 2-3 year projection
      1. All of the above comparisons plus the projection
      2. Standardize projection methods or let each modeler decide?
   4. The plan
      1. Do an assessment based on historical data
      2. Projections given a similar set of assumptions between models
         1. Projection based on F proportion used in Atlantis
      3. Compare both historical fits and projected catch advice
      4. Don't sweat the reference points--next iteration
      5. What is the historical data? (Atlantis runs, ‘truth’)
         1. Dataset with no climate, no selectivity change
         2. Dataset with changes in selectivity or climate/ocean
         3. Error /uncertainty to be added to this ‘truth’, as noted below.
   5. Uncertainty in data options. How many datasets to provide
      1. Modelers to provide ranges of cv, survey selectivity etc for us to use
      2. Selectivities in Atlantis are approximated from assessment estimates
      3. Species list finalized for each model
      4. Provide perfect information dataset?
         1. Survey total biomass index (or biomass at age?)
            1. Survey timing (season, frequency)--all?
            2. Survey area (which atlantis polygons)--all?
         2. Fishery total catch
         3. Survey age and length compositions, average weight at age
         4. Fishery age and length compositons, average weight at age
         5. Diet composition
      5. Dataset with only observation error (cv) in survey and fishery
      6. Dataset with only bias in survey (q) and/or fishery (misreporting)
      7. Dataset with both observation error and bias in survey and fishery
   6. Then iterate on this to get to a doable set of runs including the input data in the right format and the parameters “given” from Atlantis for all modelers
3. Use same scenarios on datasets from NOBA climate run?
4. Goal is to have initial results for October 2021 WGSAM meeting
5. Distribute a test dataset by early April
6. Next meeting Tuesday April 13?, same time

Chat Log:

from Grant to everyone: 5:33 AM

Morning!

from Sarah Gaichas to everyone: 5:34 AM

https://docs.google.com/document/d/17jB5Q5aXL7976P9945G75rLKHf6Ka3vT4FgCsY3Bar0/edit#

from Sarah Gaichas to everyone: 5:34 AM

https://docs.google.com/document/d/17jB5Q5aXL7976P9945G75rLKHf6Ka3vT4FgCsY3Bar0/edit#

from Grant to everyone: 5:47 AM

I think comparing the projections would be interesting in terms of how each model would percieve risk of F above something or biomass below something given the multispecies dynamics. Have a reference set of catchs to use in the projections (from the single species assessment model) and compare the trajectory/status of each species.

from Noel Holmgren to everyone: 5:50 AM

We did a Nash-equilibrium of the MSYs in our Baltic model and Robert Thorpe did the same thing for his North Atlantic model

from Michael Spence to everyone: 5:53 AM

Agree, a Nash equlibrium is when all individual species simultainuosly at SS-MSY

from Michael Spence to everyone: 5:54 AM

Well in the case Rob used it anyway

from Noel Holmgren to everyone: 5:56 AM

Yes, thats a way to descibe it.

from Grant to everyone: 5:59 AM

Yes!

from Michael Spence to everyone: 6:02 AM

How are models like LeMans, mizer and EwE, that use inputs from single-species stockassessments for things like F, getting them Fs?

from Sean Lucey to everyone: 6:03 AM

For EwE we can get a relative F using catch and biomass without using a single species assessment

from Sean Lucey to everyone: 6:04 AM

But those F will not be very comparable to Atlantis F

from Michael Spence to everyone: 6:04 AM

Is that a different F per year?

from Grant to everyone: 6:09 AM

Can we input catch for the projections rather than F? I think catch is more interesting, but unsure

from Grant to everyone: 6:09 AM

if all the models can use catch

from Grant to everyone: 6:10 AM

because there is one true future catch in reality based on the management system, 1 future F in each model would have multiple future catch streams

from Grant to everyone: 6:27 AM

I think that makes sense, I could give the range and average of CV / multinomial sample size from models I've gotten to converge

from Bjarki to everyone: 6:28 AM

I need to jump to another meeting

from Grant to everyone: 6:28 AM

Sorry, sleeper in the room

from Michael Spence to everyone: 6:29 AM

Recenlty, we have started to use selectivity from Walker et al. (2017). Where are the "true" Atlantis selectivity functions coming from?

from Michael Spence to everyone: 6:29 AM

https://academic.oup.com/icesjms/article/74/5/1448/2938485?login=true

## 

## 2021-01-26

Webinar:

<https://noaanmfs-meets.webex.com/noaanmfs-meets/j.php?MTID=m4a9be5e73b45400549988ab9feb1ba4b>

Meeting number (access code): 199 945 9220

Meeting password: whRPHYQ53p2

Attendees:

Sean Lucey

Sarah Gaichas

Robert Gamble

Kiersten Curti

Alexander Kempf

Sigrid Lehuta

Floor Soudijn

Vanessa Trijoulet

Grant Adams

Valerio Bartolino

Agenda:

1. Outline estimation models (EM)--info received to date
   1. [Gadget](https://drive.google.com/drive/folders/17QGQCo9rPJN3nOs6pMViGH4r2cf1Rb6H?usp=sharing) (with outline of likely needs for other models)
      1. Catch statistics: biomass for each model time step (usually quarter)
         1. Month smallest unit, could be semester
         2. Need to match with Atlantis output
      2. Composition of commercial catch (usually by quarter)
         1. age distribution
         2. length distribution
         3. age-length distribution
         4. usually separated by stock and fleet
      3. Composition survey
         1. age distribution
         2. length distribution
         3. age-length distribution
         4. How many surveys?
      4. Distribution of mature-immature from commercial and survey by quarter
         1. length distribution
         2. age distribution
      5. Statistics on biological data both commercial and survey by quarter
         1. mean weight@age
         2. (incl. std.dev and number of samples)
      6. Survey indices (both Num or Biom)
         1. total
         2. by age groups
         3. by length groups
      7. Stomachs
         1. prey species composition by predator size
            1. How representative do we want this?
            2. Spatial, temporal sampling can make this very challenging
         2. proportion prey size by predator size
            1. How much data is usually available for this?
            2. Is this by species? Yes for MSCAA, no for Hydra, can be for Robert’s, yes for CEATTLE
      8. Parameters generally provided/estimated outside the model (provide truth from Atlantis):
         1. L-W
         2. M1
         3. individual consumption for each predator (kg/month)
            1. avg individual consumption by length
            2. max individual consumption by length + feeding level
         4. time series otherfood for each model timestep
      9. Species subset of [Ocean’s Eleven](https://sgaichas.github.io/poseidon-dev/msSurveysTest.html),
         1. maybe add Minke Whales and prawns?
         2. cod, capelin, minke whale, polar cod, haddock, shrimp, redfish
   2. [CEATTLE](https://drive.google.com/drive/folders/1_8iVg23Xfmvl2blUQ67ohBN4cTH9aLWp?usp=sharing) (input dat files within)
      1. Anything not included in above?
   3. [State space](https://drive.google.com/drive/folders/12mqOq2LpYSR82BVrTpFqMT4VVa2i7DPo?usp=sharing) (input dat file and documentation within)
      1. Anything not included in above?
   4. Other EM experts to provide
      1. input data required and format
      2. model/data resolution (if needed at different levels--quarterly, polygon etc).
      3. Outside the model parameters needed
      4. Code for developing model input data files
      5. …
   5. Place example input files on github?
2. Outline operating model (OM): NOBA Atlantis, Cecilie Hansen
   1. Documentation
      1. [Basic](https://imr.brage.unit.no/imr-xmlui/handle/11250/2408609)
      2. [Sensitivity analysis](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0210419)
   2. Current setup
      1. Species, could add ice-dependent
      2. Scenarios
         1. Fisheries
            1. Usually run with assessment-based F as a driver from 1981-2019 for historical period
            2. Projections current: low (no) fishing, high fishing, lower fishing again 100 yrs as related to Atlantis-derived MSY, reasonably close to ICES ref pts
            3. Multiple fleets in the model

Can choose to have 1 fleet per species

Can fish multiple stocks with 1 fleet, different topics

Multiple targets per fleet

Bycatch--not implemented

Selectivity defined per fleet and not per species

* + - * 1. Selectivity implemented only for cod right now

4 fleets with variable selectivity over time

Trawl, longline, gillnet, seine

Held constant till 2019 then change over time different ways (slow, fast)

Have a scenario with cod selectivity not changing over time?--yes

* + - * 1. Likely want a simpler selectivity defined for each other species/fleet

Alfonso can find for main commercial species, Cecile can implement

Keep constant over time

Include cod

* + - * 1. Reference fleets used as abundance indices? Maybe leave aside for now
      1. Climate
         1. RCP4.5 available, temperature, salinity, currents, ice, 1981-2068
         2. Historical period same for all, can just loop 2017 for end as a constant climate instead of the change scenario
         3. Some others coming online later
    1. Output Flags
       1. ANNAGE
       2. Detailed Diet output
    2. Output Timesteps?
       1. Fishery--quarterly from 5x per year? Regular more important than exactly quarterly?
       2. Survey--determine seasonal timing and back out if 5x/yr works

1. Further description of the OM and design--
   1. Outline baseline scenario--keep initial simple
      1. Do we want to compare historical fits or also projections?
         1. Determines whether climate scenario of interest
         2. What to focus on for value added for management of multispecies models
      2. Sarah to send out a survey on what this should look like
      3. Level of uncertainty to apply to data?
         1. Cv for survey and fishery observations
         2. Have perfect data scenario and compare to increased error
   2. Then iterate on this to get to a doable set of runs including the input data in the right format and the parameters “given” from Atlantis for all modelers
   3. Expand to more scenarios later
2. Goal is to have initial results for October 2021 WGSAM meeting
3. Next meeting Tuesday March 2, same time

Notes from chat below

from Grant to Everyone: 10:06 AM

All good

from Robert Thorpe to Everyone: 10:06 AM

can't access the document I 'm afraid - Robert

from Sean Lucey to Everyone: 10:07 AM

I'll try and get you access Robert

from ching to Everyone: 10:07 AM

Hi everyone! I can’t access the document as well

from Bjarki to Everyone: 10:08 AM

the timestep size in Gadget is arbitrary

from Grant to Everyone: 10:09 AM

Accessing the document from the email worked for me, didnt work from the above link

from Sean Lucey to Everyone: 10:09 AM

Ching should be set now as well

from kiersten.curti to Everyone: 10:19 AM

The MS-SCAA model needs predator size preference as well

from Grant to Everyone: 10:21 AM

CEATTLE as well, need proportion by weight of a prey species at age/length in the stomach of a predator species-at-age

from Grant to Everyone: 10:21 AM

/length

from Cecilie Hansen to Sarah Gaichas (privately): 10:27 AM

I can check the code for possibilities of getting that output, or perhaps you've already done that?

from Robert Thorpe to Everyone: 10:28 AM

LeMans and Mizer could both have a size preference per species, or a generic one. Species preference would be a 0 or 1 modified by extent of overlap in space/time.

from Bjarki to Everyone: 10:31 AM

having trouble with my mic, what are we planning to do in terms of uncertainty of the input data?

from Robert Thorpe to Everyone: 10:36 AM

in case we wanted to try an IBM, would it be possible to project the outputs on a 1/2 x 1/2 lat/long grid ? This would also apply to primary productivity fields.

from Vanessa Trijoulet to Everyone: 10:44 AM

In the ´state-space model I only have 1 fleet by species

from Grant to Everyone: 10:48 AM

For CEATTLE we can set selectivity for all ages to 1 for any fleet if needed, or estimate it

from floor soudijn to Everyone: 11:01 AM

Thanks all, interesting to hear more model details :). I need to leave. Ciao! Have a nice day.

from Grant to Everyone: 11:01 AM

I think the estimation bias side seems to be the simplest approach using "historical data" regardless of scenario. Determining how to project the models under alternative climate scenarios I imagine will be a tad more complicated because at least for CEATTLE would have to involve updating the code to have weight/recruitment/maturity/etc driven by environmental indices

from Vanessa Trijoulet to Everyone: 11:02 AM

Sorry I have to go. I don't have environtmental effects inside the model also but it could be interested to test how the model react to climate driven data through random processes

from Grant to Everyone: 11:05 AM

Sounds great!

from Robert Thorpe to Everyone: 11:05 AM

good idea - thanks Sarah

from Grant to Everyone: 11:10 AM

No, sounds great. Thank you!

from Sigrid Lehuta to Everyone: 11:10 AM

thanks see you soon.

## 2020-12-08

Webinar:

<https://noaanmfs-meets.webex.com/noaanmfs-meets/j.php?MTID=m3b673c52338a89e75119864115f33739>

Meeting number (access code): 199 766 4552

Meeting password: EpemiGFV239

Attendees:

Sarah Gaichas

Xochitl Cormon

Kiersten Curti

Robert Gamble

Daniel Howell

Sean Lucey

Grant Adams

Alexander Kempf

Bernhard Kühn

Floor Soudijn

Bjarki Þór Elvarsson

Sigrid Lehuta

Michael Spence

Vanessa Trijoulet

Valerio Bartolino

Agenda:

1. Agree on project objectives
   1. Demonstrate what the multispecies models can offer to fisheries advice both at a tactical and strategic level
   2. Assess skill and evaluate strengths and weaknesses of different models
      1. Multispecies model skill assessment is ToR c, core mission of WGSAM
      2. Unlikely that one model outperforms all the others in all conditions
      3. Evaluate in relation a controlled set of different data properties and to the models' assumptions
   3. Notes/modifications
2. Outline project methods
   1. Use simulated data from an OM to provide an “truth” for model comparison
      1. Estimation models all coherently aligned to the same system (virtual) and data
      2. Atlantis as OM: pros
         1. largely driven by physical processes and biological pattern are mainly emergent property which is very different from most/all estimation models (EM) tested
         2. finer scale than all the EM so aggregation will be required and common to prepare the input for all the EM
         3. R package [atlantisom](https://sgaichas.github.io/poseidon-dev/atlantisom_landingpage.html) to build datasets
      3. Atlantis as OM: cons
         1. ...
      4. Describe Atlantis scenarios and datasets
         1. Possible to use more than one?
            1. Yes, but do we need to? Discuss advantages and disadvantages of having multiple models.
            2. Unless the NOBA model has an issue where it is missing something we want to test, may be easiest to work with this one. Doesn’t really matter what ecosystem is represented for our purposes
         2. Norwegian Barents Sea Atlantis [NOBA model](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0210419). Cecilie Hansen is main modeler and we will need to contact her for which runs are working and which would be best.
         3. Scenarios: [climate and fishing example](https://noaa-edab.github.io/presentations/20190528_deptIMR_Gaichas.html#7) already run
            1. Changed level of fishing pressure, but not selectivity (CCA)
            2. Newer runs with different fishery selectivity being done for NOBA--in progress.

Slow change over time

Sudden change over time (<5 yrs)

Relate to mean weight at age? Haddock selectivity at age changes due to density dependence/wt age. Selectivity at length is being implemented. Alfonso/Cecile to confirm.

California Current Atlantis (Kaplan) should copy selectivity methods from Alfonso/Cecilie NOBA

* + - * 1. May be interesting to see how multispecies model reacts to changes in fishery selectivity
        2. Survey selectivity can be done using atlantisom
      1. Datasets
         1. Example multispecies [survey indices, age and length comps](https://sgaichas.github.io/poseidon-dev/msSurveysTest.html)

Which species and fisheries?

Start with a subset of the 11 and their target fisheries

Make a table of prey mortality by age class--will need prey size info for size preference curves

* + - * 1. Example multispecies [diet data](https://sgaichas.github.io/poseidon-dev/SurveyDietCompTest.html)
        2. Missing data:

Prey size

Spatial definitions? A single area or multiple? A reasonable division into two main areas--migrations are in there and the key division would be Barents vs deep ocean/Atlantic and migration coastal vs offshore cod/herring/haddock mix in spring then leave. Need to check how migration is implemented. Focus on Barents and groundfish interaction? Mackerel herring and blue whiting for offshore areas. Competing for same food supply?

Catch and effort by fleet--4 fleets in NOBA

Reference fleet? For CPUE? May be possible but likely best to use the survey instead

Per capita consumption? C/B. where to get bioenergetic parameters? Important parameter for any model--perhaps provide the true number from Atlantis instead of estimating? Give a set of true, biased high, and biased low? Test for sensitivity

Observation uncertainty: generate an interval around the atlantisom observations? Hand models cvs? Can generate many replicates of observations so need to decide how we want to design (e.g. 100 replicate datasets and fit to each?)

Main single dataset but generate multiple datasets for people to possibly pursue different interests?

* + - * 1. Which dataset to prepare from Atln simulations?

People to help design--especially if people are not directly running a model?

Floor Soudijn (or I can help out with model simulations for one of the models if someone needs help)

Xochitl Cormon (not very available to work on it in December lots of teaching :/)

Alexander Kempf (January)

Sigrid Lehuta (January fine)

Daniel to answer questions on ecosystem/fisheries functioning

Aim for an outline for January meeting

How to compare the models and analyze the data? What will we compare? This helps design the datasets. Characterize the models--make a table, age vs length structured, how they deal with diet data, etc?

different sampling can be designed

data type, all typical but start with focus on stomachs?

sampling frequency

spatial coverage

Noise

survey selectivity is age-based and this will affect all associated into, ie indices, stomachs

specify the catchability for each species

multiple fleets (~20?) some incl mix species catches

* + - * 1. Data compilation

.rds files output from the OM

common code

* + - * 1. Information for estimation (fitting) vs parameters which are traditionally not estimated in the model

L-W

M1

Maturation

growth (emergent, visible in wgt@age)

len@age

selectivity and catchability of fisheries constant

* 1. ID estimation models and modellers
     1. Hydra :Sarah:
     2. LeMans :Mike:Robert:
     3. Mizer :Mike:
     4. Gadget :Bjarki:Valerio:Alfonso:Daniel:
     5. SMS :Nis:Alex:Morten: ?? discuss with Danes--Nis working on a TMB version of SMS
     6. State-Space :Vanessa:
     7. Rpath :Sean:Sarah:
     8. Bioen-Allom :Mariano:
     9. FLBEIA :Alex:MarkT:BernhardK: not an estimation model itself, could apply for prediction part but not estimation part
     10. MultiSppCAA :Kiersten:
     11. CEATTLE: Grant
     12. ?? SAM
     13. ?? SS3
     14. Kraken : Rob
  2. Process
     1. Set a GitHub ([wg\_WGSAM](https://github.com/ices-eg/wg_WGSAM)) or sharepoint
        1. to distribute OM output
        2. to store data prep and formatting codes
        3. to store EM output
     2. Start collate references--skill assessment paper is a start?
     3. In prep for the next meeting
        1. Ask EM experts to characterise
           1. input data required and format
           2. model/data resolution (if needed at different levels--quarterly, polygon etc).
           3. Outside the model parameters needed
           4. Code for developing model input data files
           5. …
        2. Place example input files on github?
     4. Further description of the OM and design--
        1. Come to January meeting a baseline scenario to start for all modelers to do a test run
        2. Then iterate on this to get to a doable set of runs including the input data in the right format and the parameters “given” from Atlantis for all modelers
        3. Expand to more scenarios later
     5. Goal is to have initial results for October 2021 WGSAM meeting
  3. Next meeting--week of January 26 2021, monthly (?) thereafter

Notes from chat

from Sarah Gaichas to Everyone: 10:02 AM

<https://docs.google.com/document/d/17jB5Q5aXL7976P9945G75rLKHf6Ka3vT4FgCsY3Bar0/edit#>

from Sigrid Lehuta to Everyone: 10:05 AM

I dont have access. could you allow sigridlehuta@gmail.com please ?thks

from Sigrid Lehuta to Everyone: 10:06 AM

thanks it works now

from Michael Spence to Everyone: 10:06 AM

Can I get access too michaelspence2k4@gmail.com

from Michael Spence to Everyone: 10:12 AM

Thank you!!

from Bjarki to Everyone: 10:16 AM

what plot?

from Xochitl to Everyone: 10:17 AM

yes which plot?

from Xochitl to Everyone: 10:17 AM

<https://noaa-edab.github.io/presentations/20190528_deptIMR_Gaichas.html#7>

from Grant to Everyone: 10:18 AM

yes

from Isaac.Kaplan to Everyone: 10:34 AM

I defer to Cecilie and Alfsonso on diet lengths!

from Grant to Everyone: 10:49 AM

I would need information on consumption/ration for CEATTLE.

from Grant to Everyone: 10:57 AM

For consumption/ration, I can talk to Kirstin Holsman, there is a reference of Wisconsin Bioenergetics model parameters that we've used in the past to get information on ration/consumption to parameterize another multispecies model. If there is weight-at-age data, we could use the Essington et al 2001 approach to get consumption?

from Michael Spence to Everyone: 10:58 AM

Sorry I have to go. Have fun everyone!!!

from kiersten.curti to Everyone: 11:02 AM

My apologies, I have to run to another meeting.

from floor soudijn to Everyone: 11:03 AM

Hey all, I need to leave. Thanks for the interesting meeting!

from Daniel Howell to Everyone: 11:04 AM

I worry that you guys are going to add more things than you can do. A simple set of things to look at, and then expand if you have time might be a more viable approach

from Bjarki to Everyone: 11:04 AM

sounds is breaking up for me, guess it is a problem on my end

from Alexander Kempf to Everyone: 11:08 AM

Same for me, can hardly understand what Sarah is talking....

from Grant to Everyone: 11:08 AM

Works for me!

from Xochitl to Everyone: 11:10 AM

back from holidays from 11th Jan