

Comments about an EBFM worked example for Georges Bank fisheries

EBFM Committee perspective

PDT member perspective

A. What is missing or not addressed by the existing peer reviewed worked example?

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| <p>1. With respect to the eFEP, it provides a deep range of options as a starting place for how things may function (e.g., permitting) but does not carry any one set of management tools through to a conclusion such that people can gain understanding of how the system would function.</p> <p>With the existing worked example, it provides a way to see how catch advice could be generated but stops short of providing any actual values on what catch advice would be and that seems to be important for acceptance or understanding. I think people want to see what they can catch and how that relates to what they have been able to do either historically or presently. At the end of the day, being able to 'see' what catch would look like is a bit of a hurdle that may help advance some of the other difficult discussions relating management/input controls. That is, if people expect to have better or more access to valuable stocks, they may be willing to accept changes in the management system that otherwise they would reject. So providing some sense of the catches possible may be very advantageous in this regard.</p> <p>2. Response- The problem is that I do not think the existing documents describe what I meant when I began calling for a worked example years ago. Where is the worked example?</p> <p>In a follow-up message, Andy gave a link to a 143 page document titled "Draft Example Fishery Ecosystem Plan (eFEP), which is mostly a literature review and a discussion of options for addressing various topics. It is a good document, but there are few specifics. There isn't a complete example describing all of the parts of an eFEP, or in particular, a complete example of the conservation components (e.g., assessment and ACL setting processes), which I think are the first priority. The example need not be an optimal, good, or even acceptable eFEP, but it should be specific enough so that the Council members knows what they like and dislike so we can debate how to evolve. It should also be complete enough so that the Council knows all of the decisions it needs to make. In this</p> | <p>1. I believe the biggest issue with respect to the worked example is the lack of operational objectives/guidance from the Council. Without knowing these objectives and getting feedback on what the Council wants to see with respect to the FEP, it is impossible to design an appropriate approach. This is because EBFM is not prescriptive; it is a framework by which trade-offs across the ecosystem can be assessed</p> <p>2. I believe the council and fishermen are having trouble understanding what moving to EBFM will mean for them-- when and where could they fish, how much could they catch-- what species, etc. However, it is hard to provide these details without a better understanding of what their priorities are. If we provide more details-- we might need to create more than one example of how this could move forward so they can get an inkling of how flexible EBFM can be.</p> <p>3. A clear description of what the overall approach (EBFM) or specific choices (e.g. decision points in a ceiling-based approach for catch advice derivation) gives that current management doesn't. e.g. where are the benefits / savings and where are the costs / additional complexities A delineation between EBFM, a FEP, and catch advice, and what potential decisions fit in to each of these.</p> <p>4. The latest worked example seemed to cover most of the requirements so it was tough to determine what else people wanted when they continued to ask for a worked example. Contained within a worked example should be the system for collecting data (fisheries Dep and Ind), the way those data are assessed to set reference points and derive catch advise. (Assessed could include index based metrics, biomass estimates, model estimates or any other technique for determining stock status) It should contain the management regulations such as the use of an ecosystem catch cap and the floors for individual stocks. It could be useful if some of the proposed methods for making sure specific species are not fished down were implemented such as the</p> |
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<p>regard, the 143 page document certainly identifies numerous topics that will require decisions, but there is a mixture of literature review, historical review, and discussion on each topics, such that most Council members and stakeholders will get lost even if they have the patience to read it all.</p> <p>The link in the question above goes to the agenda from the NEFSC EBFM Peer Review. It includes additional links to numerous other documents. The few of us that had the opportunity to attend the review, will probably look under the 9:30 agenda item, where there is a link to several additional documents including "Draft: Example application of operating models for Georges Bank Ecosystem EPU Strategy /Evaluation." It descriptions the application of Hydra (length based MSVPA type model) to 10 species on Georges Bank. It reports scaled biomass or catch results for six harvest scenarios (I am not sure why they are not called Harvest Control Rules). Inconsistencies in terminology is a problem with lots of documents under consideration.</p> <p>The Draft Example from the peer review also describes a portfolio analysis of ecosystem performance based on the Kraken multispecies model, which is a from of multispecies production model.</p> <p>Its unclear which of the modeling studies described in the peer review is the worked example of the eFEP, how they are related and if all of the assumptions and data inputs are consistent.</p> <p>I spent a reasonable amount of time reviewing these documents again, and I have more familiarity with the subject matter than most Council members and fishing industry stakeholders. If I cannot readily identify the worked example, I'd guess most people will be lost. I think what's missing falls into two distinctly different categories: 1. A simple, easily readable (about 10-20 pages) description that is reasonable complete without details, included hypothetical results in units (dollars, tones, days fishing) that means something to Council members and fishing stakeholders, and 2. a document that addresses technical issues that are not address by the applications of Hydra and Kraken.</p>	<p>points system (Anderson 2010). Also how permits or quota might be distributed under a more geographic system.</p> <p>a) On the assessment side of things (more for the science community), it would be useful to explicitly lay out possible ways to deal with place based management that might not include the entire population of a stock, how the survey data will be partitioned, what to do about species that are not well sampled by the survey and what it means to estimate biomass as a functional group when species have different productivities and catchability. Similarly, what it means to harvest functional groups when species have different productivities and catchabilities</p> <p>b) It would likely also be useful to state upfront that certain stocks in New England are doing poorly and that a change to EBFM is not going to magically make that better. Stocks that are limiting the catch of other species will likely continue to limit catch, at least initially under EBFM.</p> <p>5. No comment.</p> <p>6. Here, the most important thing is for the PDT is to hear from the EBFM Committee on this issue so that we can address concerns and incorporate their recommendations.</p> <p>As noted in item (2) below, the PDT focused on the performance of a particular multispecies harvest control rule. This approach was predicated on the recognition that we manage species connected through biological interactions (predation, competition, etc.) and that are caught together. Accordingly, the PDT tested a type of functional group management based on the premise that management actions that affect one species can have indirect effects on other species. It was also designed to try to address the fact that exact control of fishing mortality rates on individual species in mixed species fisheries has inherent limitations.</p> <p>It would be extremely helpful to understand additional options that the council might be interested in exploring/considering. Some examples might include:</p>

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<p>In my opinion, none of the modeling described to date constitutes a complete worked example unless it addresses exchange of energy across the boundaries of the Georges Bank EPU, and the energy flow through "pre-exploitable" (small, young) life history stages of fish, which may account for most fish production and prey of exploitable life history stages. I have raised these issues several times. A worked example also needs to be clear on the assessment methods that are to be used to generate inputs to Harvest Control Rules (HCRs or scenarios as referred to in the document).</p> <p>Also, it is unclear if ABCs are to be set on fishery Function Groups (i.e., aggregations of species) or individual species, or both as indicated in the diagrams on pages 6 and 33 of the Example document. However, Section 7 on the Overall Framework, 7.3 (page 37) on Catch Limits, describes an overall cap on catch for the ecosystem and a catch limit for Species Complexes. There is no mention of catch limits for individual species, contrary to the two aforementioned diagrams. I pointed out this inconsistency at the SSC meeting on the NEFSC Peer Review of EBFM, but the inconsistency remains in the document. Which is it? Also, there are inconsistencies in terminology. For example, the two diagrams and the text referred to above seem to use the terms "Functional Groups" and "Species Complexes" for what seem to be the same thing.</p> <p>There's also lack of clarity about how the EPU catch cap is to be set. Page 36 of the Draft Example describes the connection between primary production and fish exploitation rate. It indicates that the exploitation rate should be 18-20% of primary production, which according to the diagram that follows, is 200 or 300 grams dry weight of carbon per meter squared per year, depending on whether or not nano and pico plankton production is included. I can still figure out what this means (if I find a few references in my library), but it is meaningless to Council members and fishing industry stakeholders. Perhaps even more important, it is unclear if this methodology is to be used in the FEP, since other approaches are also described (multispecies production model). What was the basis of the overall cap on catch for the examples of Hydra and Kraken at</p>	<p>a) Set an catch overall cap on catches based on productivity levels for Georges Bank and then setting TACs for individual species where possible. The sum of these individual species TACs would not exceed the catch cap This approach was actually implemented of the US Northeast Shelf during the period 1973-76 under ICNAF and it is currently used for managed for fisheries in Alaska.</p> <p>b) Identify a core group of selected species for management using species-level TACs and the remainder using functional group management.</p> <p>1.</p>

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<p>the NEFSC EBFM per review? Another issue is how an energetic approach for setting a cap on EPU removals takes account of the energy needs of pre-exploitable fish (an issue raised above). Another important technical issue is the basis for reference levels used in candidate management procedures. As I recall, the so called floor for individual species is based on either a percent of the unexploited biomass of a species (e.g., 20%B₀) or a percentile of resource survey catch per tow. How are species interactions taken into account in the specification of floors? This is potentially an important issue. For example, if species PD generates a lot of predation mortality on species PY, it would seem that the floor for PY should be conditional on the abundance of PD. However, if the floor for PY is constant (based on a single species model to estimate B₀ or a percentile of survey catch per tow), the species may fall below the floor when PD is abundant because of predation. If the response is to put in place measures to protect PY that also make it harder to catch PD, the species of concern (PY) may decline more instead of recovering. Maybe the correct response is to fish PD harder. Did the applications of Hydra and Kraken consider species interactions in setting species abundance floors?</p>	
<p>b. What key attributes should a tangible worked example have? How should they be expressed? In relative or absolute values? Should the results be compared with real historic data or with a status quo management scenario?</p>	
<p>1. Catch advice. Using the currency of the eFEP--fishery functional groups, metiers, etc. To the extent absolute values can be generated, they should be provided with the appropriate caveats and conditions highlighted that they are an example only. As long as there is a 1:1 comparison of something tangible, it likely shouldn't matter. Using recent history (post 2010) or more recent information would provide a comparative context that people may be clamoring for to understand how one system compared to another. It needn't have the definitive management system in place, but should carry through one example of the management controls from the eFEP (i.e., one permitting regime, one management area). Make the decisions and</p>	<p>1. No comment.</p> <p>2. If possible, lets give them some idea of what they could fish for, when they could fish, where they could fish, etc. It seems to be absolute values might set unrealistic expectations. Thus I would do relative values (if possible) and compare it to status quo. Again, I think we might need to provide more than one contrasting options.</p> <p>3. I think this largely depends on the purpose for the worked example. If it is to be an example of a FEP, I think the attributes should be on a decision tree outlining the types of decision points, and examples of</p>

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<p>explain how it could work for people to react to. These needn't be the final choices on how the FEP would operate.</p> <p>2. Response- It should be clear, concise and complete. I envision a 10-20 page document with many appendices of whatever length necessary. I would aim for a document as follows:</p> <p>a) General overview of approach- Specify Ecosystem Production Units (EPU) by area and managed species, subdivide the species into functional groups (FU), define fisheries by gear type and species caught, etc., set EPU catch limit, set FU catch limits, set floors (biomass thresholds below which stocks are in jeopardy), describe management measures to be applied to EPU (ACLs, effort limits, and/or other), use MSE to establish control rules based on data and/or assessment results for the EPU.</p> <p>b) Describe how EPUs, FU, fisheries, and floors were specified.</p> <p>c) Describe how the Georges Bank EPU is connected to other EPU (at least in the context of energy exchanges).</p> <p>d) Describe changes in permitting, data collection, etc. that will be necessitated as a result of the FEP. I think the worked example should apply the least disruptive method--least change from the status quo. The FEP is not primarily about fixing existing problems in data collection, permitting, etc.</p> <p>e) Describe the concept of MSE and how was applied to select the example control rules.</p> <p>f) Give hind-cast results- What could have happen over a decade or more sometime in the past if the example FEP had been in place. Use graphs.</p> <p>g) Next steps- What should Council members and stakeholders do to evolve from a worked example to a viable FEP?</p> <p>The results from the worked example should be reported in units that make sense to Council members and stakeholders, probably weight of catch or stock size. The results from applying the example FEP to past data (over a decade or more) should be compared to actual occurrences.</p>	<p>decisions (and ways of making them) for each. If the worked example is to be an example of (say) how to derive catch advice.</p> <p>Another attribute (and again I think we addressed this well in our previous remit) is to relate the decision points & methods to their equivalent under what type of method/output would be generated under status quo management. (i.e. so people can see where each piece 'fits') . Note that here by 'status quo management' I mean the current rules used to determine advice, not the numbers.</p> <p>Overall, I think a worked example should have at its core an issue(s) or question(s) that the Council/Committee/stakeholders would like to explore solutions with using EBFM. This can be done through the existing eFEP, which highlights steps around a lot of things, but does include one instance of a particular process (namely a stock complex approach to generating catch advice). [definitely overlap with your first question on this point, sorry]</p> <p>4. I think it is very hard to compare a modelling exercise where management decisions have major impacts on stocks with historical data. There are a lot of subtle factors that made things end up the way they did that are tough to capture in a model. I think it would be most appropriate to compare single species and EBFM output from the same simulated starting conditions.</p> <p>5. No comment.</p> <p>6. The worked example provided to the council focused on the question of whether it is feasible to define management targets at the functional group level while providing safeguards against over-exploitation at the species and the functional group level. The harvest control rule tested in the simulation embodied this concept. The parameters used in the simulation model (Hydra) to test this concept were determined based on real data for the species included. The simulations further were constructed to ensure that the model outputs in terms of biomass and yield were consistent with the range of observed values in the historical information for Georges Bank</p>

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	<p>since implementation of the MSFMCA.</p> <p>The results can be expressed in either absolute or relative terms. But it is important to recognize that the simulations were not constructed to attempt to reproduce the actual historical sequence of biomass and catches observed. The actual sequence is a result of a complex series of changing management actions over the last four decades and an element of random variation in the populations (particularly in recruitment). For this reason, we ensured that the results fell within historical ranges but not that the historical sequence was replicated. We tested performance of a ramped harvest control rule against a baseline in which a species was declared overfished if it dropped below a threshold of 20% of its unexploited level (a proxy for status quo management in this context).</p> <p>7.</p>
c. What inputs should a tangible worked example use? A simulated population of key stocks or actual, historic data?	
<p>1. Historic data provides a greater context for people to understand and relate. This has seemed to be an important and largely difficult challenge with the worked example and eFEP, i.e., having an example complete system and catch outputs for discussion.</p> <p>2. Response- Both. Simulated populations should be used for MSE to select control rules to be applied in the worked example. Then the following five sets of time series of catch, biomass, etc. (see response to the next question) should be compared:</p> <p>a) Simulated results from applying the example FEP control rules to simulated population and simulated data based on initial conditions (i.e., population estimates) for the first year of the simulation.</p> <p>b) Same as 1 except that control rules and decision process (to the extent that they can be quantified) that had been used in the past are applied instead of the example FEP.</p>	<p>1. No comment.</p> <p>2. I don't have a strong opinion on this. Seems to me the retrospective issues with the stock assessments suggests simulated data may not be appropriate as it might over-estimate recovery/catch limits in the future.</p> <p>3. Any analysis to assess performance of an approach with respect to objectives should be based on an integration of possibilities (given plausible uncertainty), whether this is from simulation or from historic data -> that is, even if using historic data to condition the approach, the example should look at the possible outcomes rather than the outcome given the one instance that we have. I am not arguing for long-term vs short-term, it is entirely possible to assess short-come consequences in a way that integrates over uncertainty with regard to our knowledge of the state of nature.</p> <p>If the purpose for the example is a demo of the pieces then using data</p>

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<p>c) Simulation results from applying the example FEP control rules to the actual annual data (e.g., annual stock assessment of survey results) from same period in the past.</p> <p>d) Same as 3 except that control rules and decision process (to the extent that they can be quantified) that had been used in the past are applied instead of the example FEP.</p> <p>e) Actual annual catches and biomass levels.</p> <p>Comparisons of (a) 1 to 2 and (b) 3 to 4 will indicate the differences between past single species approaches and EBFM. Comparison (c) 1 to 3, and (d) 2 to 4 will indicate how well the population models match reality. Comparison of (e) 4 to 5 will indicate how much management actually influenced the system.</p>	<p>is fine, but there should be an explicit statement that decisions to adopt an approach should be based on the pros/cons of the approach and not the results in terms of advice outputs. We should strive to frame this as a choice on over how to go about making decisions, not over the one-time outcomes of applying a decision. This is why I prefer the simulated version (though the simulations can be conditioned on the historical data).</p> <p>4. I think things that might be emphasized are the long term yield, the consistency in catches from year to year and how things would be similar and/or different. In some situations, the management and assessment process might be different, but the decisions on the water could be pretty similar, while in other cases there might need to be a large change in how fishing operations are conducted. Might also be useful to discuss what type of flexibility might be added to the regulations to deal with choke stocks. Many of the changes under EBFM might be more in explicitly considering trade offs when making decisions and efficiency savings with management and assessments. Not all those things are likely to be as important to the industry.</p> <p>5. I would urge caution in trying to compare any new example to historic data. If the committee want to compare the current management regime to a new EBFM regime then it should be done as a status quo scenario within a simulated data set. That data set can be conditioned on existing conditions but it becomes very difficult to fully capture all of the responses to the multitude of management decisions that have been enacted on Georges Bank over the years. I actually think a scenario planning exercise might be helpful to set the context of what we are trying to achieve.</p> <p>6. As noted above, we used a simulation approach that used actual data to estimate inputs to the model. These included observed growth, maturity, recruitment, food habits, fishery selectivity etc. I believe this is the most realistic approach.</p>

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	<p>However, I think it could be helpful to show the actual observed changes in biomass, catch, etc. from the historical record to provide context for the 10 species in the simulation. It would also be possible to show observed changes using our functional groups but including a broader species as identified in the PDT worked example PDT if that would help make the overall approach more tangible. This of course would not constitute a test of the performance of the underlying concepts in the management procedure (or others that might be considered) but it would demonstrate how actual data would be assembled for analysis and what the historical trends under the management options employed in the past were like.</p>
D. What kind of results are you looking for that you think would make it more tangible?	
<ol style="list-style-type: none"> 1. See above. There is some risk that a revised worked example with catch advice could become iterative as people want to tweak components to continually get a different outcome. However, the risk seems worth it to advance the discussion on the FEP. Certainly look forward to this discussion continuing with the PDT, Committee, and Center. I'm curious to see how the communication contractor fits into this discussion and what advice or input they may provide. If they have a way to achieve the same type of engagement and clarity for people to grasp and understand the eFEP, particularly if that negates the need to develop another worked example or generate catch advice, I'd be very open to that. 2. Response- Comparison of results by applying the FEP to past data to actually occurrences for the following performance measures: catch by species, species biomasses, days fished by fleets, frequency of stocks being below floors, revenues. Calculate mean and variance for each performance measure. 	<ol style="list-style-type: none"> 1. No comment. 2. In my opinion, we should list a 5-10 possible priorities for the groundfish fisheries and then explain how the FEP might vary depending on what the top priorities are. 3. I think if we were to view the worked example as a demonstration as to how the elements of the eFEP fit together to 'work' as a possible solution to fisheries management, then some kind of navigable, interactive flowchart or decision tree that links the various pieces that a user can follow by themselves would help. For a more specific part of the process, say deriving stock complex-based catch advice, then an outline of a method that produces parallel output under both current decision-making framework and an alternative that fits under the EBFM umbrella would be helpful - and one that ideally people can engage/play with directly. 4. At the end of the day, people likely want to know what the quota levels will be under the two systems. It is tough to provide specific numbers for that, but showing proportionally how different they might be as well as how varied quotas are under the two systems and how complex or simple regulations could be under the two systems

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	<p>are likely useful.</p> <p>5. No comment.</p> <p>6. Again, here the PDT will benefit greatly from the insights and advice from the EBFM Committee.</p>

E. General thoughts, comments, suggestions, etc.

	<p>1. No additional comment.</p> <p>2. Fisheries management in New England has been and continues to be challenging as fisheries catch a mix of species with a variety of life-history characteristics. I am concerned that fishermen are hoping EBFM will provide the basis for allowing them to continue targeting the same species in the same way they have historically (same gear, locations, etc.) while removing current constraints of low abundance species (choke stocks). While I understand this desire, it is not possible given the current status of some fish stocks in NE and the requirements of MSA.</p> <p>However, EBFM can provide options for better accounting for interactions between species. There is flexibility on how an EBFM system can be designed-- and the specifics of what EBFM will look like will depend on what the Council and stakeholders want. For example, if the Council determines that the primary objectives for the groundfish fisheries are retaining the current fleet structure (small boat fleets) and maximizing revenue for these fishermen, then the PDT can work to design a program to meet those objectives. Alternatively, the Council could determine that the primary objectives for the groundfish fisheries are to continue exploiting the historical mix of stocks, and increasing efficiency. Very different programs would be designed to meet the first set vs second set of priority objectives. For example, the first set of objectives could require targeting different species of fish for much of the year, and the second set of objectives could likely result in consolidation of boats.</p> <p>Take home point: EBFM can help address issues raised by multi-</p>
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	<p>species fisheries. However, scientists and managers need more guidance from the Council on their priorities. I would like to suggest that GreenFinStudio use some of their outreach time to collect feedback from stakeholders on what are the priority objectives for groundfish fisheries in NE.</p> <p>3. No additional comment.</p> <p>4. No additional comment.</p> <p>5. No additional comment.</p> <p>6. No additional comment.</p>