Element 1: Research (30)

Objective: Support the development of ecosystem approaches to fishery management/Integrated Ecosystem Assessment (IEA) and Management Strategy Evaluation (MSE) for the U.S. Northeast Continental Shelf

1. Conduct research on implementing ecosystem approaches and IEAs.

- Continued work with interdisciplinary working groups supporting Integrated Ecosystem Assessments (IEAs). In collaboration with NEFSC EDAB, SSB, PSB, and other staff, October 2019-April 2020:
    - Supported working group developing EAFM conceptual model for Mid-Atlantic summer flounder
    - Developed interactive conceptual model visualizations for Mid-Atlantic summer flounder with DePiper and Muffley: https://gdepiper.github.io/Summer_Flounder_Conceptual_Models/sfconsmod_riskfactors _subplots.html.
    - Developed and refined proposed management questions based on the conceptual model
- Continued research related to State of the Ecosystem reporting to improve management relevance by including ecosystem conceptual models, aligning indicators with general US IEA objectives, and synthesizing results across indicators.
    - Produced final conceptual model from workshop draft outlining links between SOE indicators from environment through fish condition to human dimensions
    - Will support research linking conceptual model components, continue with open science principles using seaside chats

2. Contribute to the development and implementation of multispecies and ecosystem MSE operating models.

- Continued research using Atlantis models as operating models to test stock assessment model assumptions under climate change scenarios with Lynch and Kaplan: "Fragile ecosystems, robust assessments? Performance testing stock assessments for the California Current and Nordic and Barents Seas under climate change"
    - Ran stock synthesis model with Atlantis "data" input, Oct 2020
    - Developed wrapper functions to extract assessment data from Atlantis, Jan 2020
    - Ongoing work extracting full age structured data from Atlantis for assessment model ensemble comparisons in collaboration with Norway IMR, Bergen, March 2020
    - Visualizations: https://sgaichas.github.io/poseidon-dev/
- Developed model key run review criteria for use in ICES WGSAM multispecies model review
- Compiled ICES Science Report with WGSAM multispecies model reviews, Baltic Sea
    - Review criteria: https://ices-eg.github.io/wg_WGSAM/ReviewCriteria.html
    - ICES. 2019. Working Group on Multispecies Assessment Methods (WGSAM). ICES Scientific Reports. 1:91. 320 pp. http://doi.org/10.17895/ices.pub.5758
- Initial development of diagnostic scripts for NEUS Atlantis
    - Objective: automatically test whether model meets Atlantis review criteria
    - Progress: https://github.com/NOAA-EDAB/neus-atlantis/tree/master/diagnostics
    - Visualization: https://noaa-edab.github.io/neus-atlantis/DiagnosticsDoc.html
- Organize and lead monthly ecosystem/multispecies modeling meetings to coordinate modeling projects, progress
    - Listed ecosystem/multispecies model workplan with current status and development needs in progress
    - Established objectives and began project planning for multispecies model key run for Georges Bank to be reviewed by WGSAM in 2021
- Multispecies model comparisons, length structured vs age structured
    - Joint research with K. Curti, PDB; internal funds from NERAP/EBFM
    - `atlantisom` R package will be used to generate data for the multispecies model comparison project and performance testing for 2021 key run review

3. Communicate research results through peer-reviewed manuscripts, reports, and oral/poster presentations at scientific meetings

- Published

Link, J. S., Huse, G., Gaichas, S., and Marshak, A. R. 2020 . Changing how we approach fisheries: A first attempt at an operational framework for ecosystem approaches to fisheries management. Fish and Fisheries, 21: 393–434.

Weiskopf, S. R., Rubenstein, M. A., Crozier, L. G., Gaichas, S., Griffis, R., Halofsky, J. E., Hyde, K. J. W., et al. 2020 . Climate change effects on biodiversity, ecosystems, ecosystem services, and natural resource management in the United States. Science of The Total Environment: 137782.

Townsend, H., Harvey, C. J., deReynier, Y., Davis, D., Zador, S. G., Gaichas, S., Weijerman, M., et al. 2019 . Progress on Implementing Ecosystem-Based Fisheries Management in the United States Through the Use of Ecosystem Models and Analysis. Frontiers in Marine Science, 6. https://www.frontiersin.org/articles/10.3389/fmars.2019.00641/full (Accessed 19 November 2019).

- Accepted

Lucey, S. M., Gaichas, S., and Aydin, K. Accepted . Conducting reproducible ecosystem modeling using the open source mass balance model Rpath. Ecological Modelling.

- Submitted

Staudinger, M., Lynch, A., Gaichas, S., Fox, M., Gibson-Reinemer, D., Langan, J., Teffer, A., Thackeray, S., and Winfield, I. Submitted April 2020 . How does climate change affect emergent properties of aquatic ecosystems? Fisheries

Muffley, B., Gaichas, S., DePiper, G., Seagraves, R., and Lucey, S. Submitted January 2020 . There is no I in EAFM: Adapting Integrated Ecosystem Assessment for Mid-Atlantic Fisheries Management.

Bastille, K., Hardison, S., DeWitt, L., Brown, J., Samhouri, J., Gaichas, S., Lucey, S., Kearney, K., Best, B., Cross, S., Large, S., Spooner, E. Submitted January 2020 . Improving the IEA approach using principles of open data science.

- In Prep

Kaplan, I., Gaichas, S., Stawicz, C., Lynch, P., Marshall, K., Deroba, J., Masi, M., Brodziak, J., Aydin, K., Holsman, K., Townsend, H., Tommasi, D., Smith, J., Koenigstein, S., Weijerman, M., Lucey, S., Link, J. Management Strategy Evaluation: Allowing the Light on the Hill to Illuminate More than One Species.

Kempf, A., Lehuta, S., Spence, M., Gaichas, S. , ... Skill assessment of models relevant for the implementation of an ecosystem approach to fisheries management.

- Scientific meeting presentations, Sept 2019-April 2020

SK Gaichas, GK DePiper, R Seagraves, B Muffley, S Lucey. There is no I in EAFM: adapting Integrated Ecosystem Assessment for Mid-Atlantic Fisheries Management. 2019 CERF Biennial Conference. Presented by Sean Lucey

SB Hardison, SK Gaichas, S Lucey, S Large. An open-science approach to ecosystem reporting for IEA in the Northeast US. 2019 CERF Biennial Conference. Presented by Sean Hardison

I Kaplan, S Gaichas, P Lynch, C Stawitz, C Hansen. Fragile ecosystems, robust assessments? Performance testing stock assessments for the California Current and Nordic and Barents Seas under climate change. 2019 PICES Annual Meeting. Presented by Isaac Kaplan

R Wildermuth, G Fay, S Gaichas, G DePiper. A Bayesian decision network model for ecosystem-based management of the Georges Bank social-ecological system. 2019 PICES Annual Meeting. Presented by Robert Wildermuth

M Fogarty, A Beet, S Gaichas. Fishery Functional Group Management. American Fisheries Society & The Wildlife Society 2019 Joint Annual Conference. Presented by Mike Fogarty

RJ Gamble, J Tam, G DePiper, SK Gaichas, SM Lucey, PM Clay, G Fay, ... Integrating Conceptual and Qualitative Models in Integrated Ecosystem Assessments–a Case Study in the Northeast United States Large Marine Ecosystem. American Fisheries Society & The Wildlife Society 2019 Joint Annual Conference. Presented by Robert Gamble

4. Review scientific manuscripts, research proposals, and job completion reports as requested.

- Chaired Baltic Sea multispecies model key run reviews for ICES WGSAM, October 2019.
- Invited peer reviewer for ASMFC Atlantic menhaden stock assessment and ecological reference points, week long panel in November 2019.
- Completed 2 internal reviews (one book chapter for S&T, one article for AFSC).

- 1 review in progress for ICES JMS.

Element 2: Program support (10)

Objective: Provide analytical support for EDAB and MSE research initiatives

1. Provide analytical support for Ecosystem Approaches

- Led State of Ecosystem 2020 report production for Mid-Atlantic and New England Councils
- Supported megafauna, visualization subgroups for SOE
- Successful grant proposal with K. Curti (PDB) for internal NRAP/EBFM funding to support multispecies model development and comparison (also applies to MSE)
- Collaborating on CINAR funding mechanism with K. Hyde, A. Mercer to get postdocs

2. Play lead role in Management Strategy Evaluation for EDAB and coordinate with other Center scientists working on MSE

- Setting up project management for 2021 model key runs
- Successful grant proposal with G. DePiper (SSB) for MSA funding to support MAFMC MSE analyst in SSB
- Coordinating internal MSE working group for MAFMC summer flounder MSE
- Outlined potential workplans for IEA funded MSE contract labor
- Co-chair of National MSE working group; organized March 2020 meeting, collaborating on national MSE use and prioritization guidelines

3. Serve as mentor for Center staff, graduate students, and post-doctoral researchers as appropriate.

- Serve on 2 PhD committees: Robert Wildermuth (SMAST), Jim Gartland (VIMS).
  - NMFS mentor for Robert Wildermuth 2018 PopDy Fellowship
  - recommended Robert Wildermuth for 2020 Berkely Conservation fellowship
- "Opponent" for University of Iceland Doctoral Candidate Paul Frater, defense scheduled for 5 June 2020
- Post-doc co-advisor (with V. Saba), Joe Caracappa
- Post-doc co-advisor (with J. Deroba, D. Lyons), Lauren Scopel

Element 3: Products and Services (30)

Objective: Provide accurate and timely information in support of Ecosystem Approaches to Management/Integrated Ecosystem Assessments and Management Strategy Evaluation

1. Contribute to the development of Ecosystem Approaches and IEA Products and Services on the Northeast US Shelf

- Co-lead, Mid-Atlantic EAFM conceptual modeling
  - Developed visualizations and presented to MAFMC, December 2019
  - Presentation with management questions: https://gdepiper.github.io/Summer_Flounder_Conceptual_Models/sfconsmod_final_2col.html
  - Council selected management question and agreed to move forward with EAFM MSE
- Lead editor, State of the Ecosystem Reports (Mid-Atlantic and New England)
  - Supported regular check-in meetings, Sept-December 2019
  - Collaborated on strawman synthesis, participated in synthesis workshop Jan 2020
  - Provided draft document for collaborative editing Jan 2020
  - Transferred to rmarkdown for pdf production, edited
  - Finalized text and alt-text for 2 page summary
  - Submitted to internal review Feb 2020
  - Wrote new "response memo" detailing all 2019 requests and resulting SOE changes
  - Completed internal review edits and submitted to Council SSCs for review
  - Collaborated on SOE web story and website resource wrapper
  - Developed presentations and presented to both SSCs, March 2020
  - Revised documents based on SSC feedback and submitted to Councils, March 2020

– Developed presentation and presented to Mid-Atlantic Council, April 2020
- Lead editor, Mid Atlantic EAFM Risk Assessment
  – Updated portions of the risk assessment based on SOE 2020 indicators
  – Incorporated updated management indicators from Council staff
  – Suggested additional indicators and considerations for MAFMC
  – Developed presentation and presented Mid-Atlantic Council, April 2020

2. Contribute to the development of Management Strategy Evaluation Products and Services on the Northeast US Shelf

- `atlantisom` R package development: create assessment model performance testing datasets from Atlantis model output, now providing input to SS3 stock assessment model with S&T and NWFSC colleagues, SAM model input in progress with IMR colleagues
  – Package: https://github.com/r4atlantis/atlantisom (testing branch annage)
  – Development notes: https://github.com/sgaichas/poseidon-dev
- MAFMC summer flounder recreational discards MSE
  – Coordinating planning with SSB, PDB, MAFMC staff
  – Developing "this is MSE" presentation, remote stakeholder engagement plans
  – To start May 2021

Element 4: Planning and evaluation (20)

Objective: Planning and Evaluation for Ecosystem Approaches and Management Strategy Evaluation

1. Serve on committees, steering groups and task forces

- MAFMC Scientific and Statistical Committee: establishes Acceptable Biological Catches for managed Mid-Atlantic fisheries. Next (virtual) meeting scheduled for May 2020. Providing meeting summary reports to NEFSC leadership, Assigned lead: blueline tilefish; on committee developing approach to estimating level of scientific uncertainty in overfishing limits (OFL CV subcommittee).
- MAFMC's Ecosystem Approach to Fisheries Management Working Group; see above for contributions.
- MAFMC *Illex* Working Group: develop scientific products based on fishery catch per unit effort and ecosystem indicators to base annual catch recommendations on the best available scientific information.
- National MSE working group co-chair: see above for responsibilities.
- Steering committee member, PAradigm for New Dynamic Ocean Resource Assessments and exploitation (PANDORA), EU project
- 2019 National Ecosystem Modeling Workshop (NEMoW) steering committee; unable to attend due to conflict with MAFMC EAFM Conceptual Model presentation in December
  – Developed NEFSC overview presentation (presented by Scott Large)
  – Developed `atlantisom` tool demonstration (presented by Christine Stawitz)

2. Actively promote interactions between the Ecosystem Assessment Program with other Center Divisions, the Center Directorate, and the interested public. Actively promote interdisciplinary MSE within and beyond the Center

Scientist interactions

- Member and current co-chair of ICES WGSAM (member 2011-present, co chair since 2016), which reviews and contributes to multispecies and ecosystem modeling progress across the ICES regions (the North Sea, Baltic Sea, Bay of Biscay, Mediterranean, Iceland, Barents/Norwegian Seas, and eastern USA).
  – Developed agenda and co-chaired October 2019 meeting in Rome, Italy
  – Provided US updates collected from around the nation
  – Finalized 2019 report (model reviews) on schedule for delivery to WKIRISH
- Member and past co-chair of ICES WGNARS (2012-present), developing ecosystem indicators and integrated ecosystem assessments for Canadian and U.S. marine ecosystems.
  – ICES WGNARS presentations on SOE and Council updates recorded April 2020
  – 2020 meeting rescheduled to one day virtual meeting, 8 May, due to COVID-19
- See multiple national and regional ecosystem and MSE working group responsibilities above.
- Provide briefings to Center Directorate on Council agenda items as requested

- Active ongoing collaborations between NEFSC EDAB and SSB, PSB, OCB for IEA work
- Affiliate Faculty at SMAST, April 2016–present
- Continuing collaboration with AFSC on development of food web models in R.
- Continuing collaboration on COCA MSE project with GMRI/SMAST
  - Consulting on multiple groundfish models
  - Facilitating collaboration between COCA postdocs and NEFSC scientists including Min-Yang Lee (SSB) and Anna Birkenbach (U. Delaware).
- Continuing collaboration on seabirds/fishery management postdoc project with Gemma Clucas at Cornell
- Peer review panelist, ASMFC Atlantic Menhaden stock assessment and ecological reference points, Nov 2019
- Previously scheduled meetings/presentations now postponed due to COVID-19:
  - NMFS Atlantic Coast Science Coordination Workshop, Raleigh-Durham NC, April
  - NOAA Science Advisory Board Ecosystem Sciences and Management Working Group, Boulder CO, May
  - Multispecies Modeling in Support of Fishery Management Workshop, SMAST, June
  - Rutgers Undergraduate Fisheries Course (EBFM and MSE), Rutgers NJ, June

Fishermen/Industry interactions

- Day trip on F/V Darana with Capt. Jimmy Rhule out of Pt Judith RI, October 2019
- ASMFC Atlantic Menhaden peer review panel, November 2019
- MAFMC meeting, December 2019
- MREP EBFM presentation, February 2020
- Maine Fishermen's Forum, March 2020

3. Interact with stakeholders to disseminate knowledge via courses, seminars, lectures and workshops as appropriate

- NEFSC seminar Oct 2019
- SMAST seminar Oct 2019
- AFSC groundfish/One NOAA seminar Nov 2019
- Canada-US Ecosystem Science (CAUSES) workshop participant Nov 2019
- *Illex* summit participant, fishing industry sponsored science workshop Nov 2019
- EBFM seminar January 2020
- MREP EBFM course section February 2020
- Maine Fishermen's Forum MSE simulated stakeholder workshop March 2020
- MAFMC SOE Council presentation in element 3 above, April 2020
- SIAM visiting lecture (virtual!) at WPI scheduled for April 28 2020
- Shoals Marine Lab IEA course scheduled for July 2020–might happen?

Element 5: Corporate Responsibility, Training, and Professionalism (10)

Objective: support a safe, secure, and productive workplace; follow required policies and procedures; enhance professional knowledge and skills in support of organizational performance; and promote positive interactions with coworkers, partners, and the public

1. Safety and Security. Foster a safe and secure work environment, including complying with agency safety and security, environmental compliance, and IT security policies, plans, and requirements. Keep work areas free of known hazards and comply with all occupational safety requirements. Promptly report all known and suspected safety problems to supervisor.

- Complied with agency safety and security policies.
- Complied with IT security policies, and upgraded security on github account to comply with possibly forthcoming policy.
- Work areas are free of known hazards. No safety problems to report yet this year.

2. Policies. Adhere to DOC, NOAA, NMFS, and SF policies and procedures (e.g., Records Management, T&A, and Telework) and complete required training by established deadlines. Maintain accountability of assigned government property and report lost property promptly. Follow NOAA IT policies including directives in "Appropriate Use of Government Equipment." Comply with travel regulations and policies, including proper use of the government travel cards. Ensure sensitive Personally Identifiable Information and Business Identifiable Information, both physical

and electronic, is protected from unauthorized release, alteration, loss and deletion, and complies with security and privacy policies regarding access to computerized and paper files.

- Completed required training well before deadlines.
- Reported all government property upon request.
- Followed IT equipment and ravel policies.
- Followed all PII and BII procedures (I rarely work with this type of data).

3. Professional Development. In coordination with supervisor, complete identified opportunities for training and professional development beyond mandatory training requirements to maintain and/or develop professional knowledge and skills. Provide appropriate documentation of completion of training to supervisor and complete training-related reporting requirements. Discuss outcomes with supervisor and, as appropriate, share knowledge learned with colleagues.

- I'm trying to incorporate more automation and open science principles into my daily workflow. This involves trying new R packages for interactive presentations and document writing as well as data wrangling and analysis.
- I'm also trying to learn more formal project management methods (unfortunately scheduled training conflicted with previously scheduled meetings for me).
- Seaside chats are providing many opportunites for professional development.

4. Teamwork and Cooperation. Foster a respectful and inclusive workplace and contribute positively to the office and the agency. Respond in an appropriate and timely manner to changes in work priorities. Participate constructively in teams and cross-cutting efforts in support of the office or agency. Foster teamwork and cooperation by sharing information and expertise.

- I'm finding google chat helpful to work with our team remotely. I prioritize group meetings and team projects such as the SOE and our website transition and try to give timely input.
- I work on IEA and MSE teams across branches and divisions within NEFSC, and co-chair the national MSE working group (see Element 4, point 2).

5. Professional Conduct. Follow agency professional conduct, diversity, ethics, and EEO policies. Exhibit competency, integrity, good judgment, and courtesy when interacting with colleagues and the public.

- Trying my best.