NMFS FELLOW - CONTINUING REPORT

NMFS Fellows - 2016-2017
Christine Stawitz
NMFS/Sea Grant Fellowship - Population and Ecosystem Dynamics - Evaluating the importance of growth variation in marine fish population dynamics and stock assessment
E/I-24
Submitted On: 03/22/2017 10:23:52 AM

METRICS & MEASURES

Metric/Measure	Value	Note
Acres of coastal habitat		
Fishermen and seafood industry personnel		
Communities - economic and environmental development		
Stakeholders - sustainable approaches		
Informal education programs		
Stakeholders who receive information		
Volunteer hours		
P-12 students reached		
P-12 educators		

REQUESTED INFORMATION

Publications

The financial and ecological implications of seafood mislabeling
Publication Type: Peer-reviewed: Journals (incl. articles), Books, Proceedings, and Other Documents
Publication Year: 2016
Publication Authors:
Publisher Info: Conservation Letters
Notes:
Related URLs:
Keywords:
Publication URLs:
Abstract:
Citation: Stawitz, C.C., Siple, M.C., Munsch, S.H., Qi, L. 2017. “The financial and ecological implications of seafood mislabeling”. Conservation Letters. 10.1111/conl.12328
Citation for Coverpage:
SG can post PDF online?:
Uploaded File:

Students Supported

Christine Stawitz (Continuing Student)

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University of Washington, Quantitative Ecology and Resource Management

Field of Study: Quantitative Ecology and Resource Management
Advisor: Tim Essington
Degree Type: PhD
Degree Year: 2017

Student Project Title: Somatic growth variation in marine fish: drivers and impacts for population, production and assessment

Involvement With Sea Grant This Period (capstone, fellow, intern, etc.): fellow

Post-Graduation Plans (employer, grad school, etc.): Post Doc with JISAO

Was this thesis/dissertation supported by Sea Grant?: No

Thesis / Dissertation:

New or Continuing?: continuing

Degree awarded this reporting period?: No

Financially supported?: No

Narratives

NMFS/Sea Grant Fellowship: E/I- – 24 - – Population and Ecosystem Dynamics - – Evaluating the importance of growth variation in m
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Partners This Period

Alaska Fisheries Science Center (US DOC, NOAA, NMFS)
Types: Government
Scale: FEDERAL or NATIONAL
Notes: I worked with Anne Hollowed of NMFS on this project.

STANDARD QUESTIONS

Community Hazard Resilience

No **Community Hazard Resilience** information reported

Economic Impacts

No **Economic Impacts** information reported

Impacts and Accomplishments

No **Impacts and Accomplishments** information reported

Leveraged Funds

No **Leveraged Funds** information reported

Meetings, Workshops, Presentations

No **Meetings, Workshops, Presentations** information reported

Tools, Technologies, Information Services / Sea Grant Products

(1)

Description	Analysis of impact of growth variation on population production, which is being submitted for publication.
Developed (in the reporting period)?	Yes
Used (in the reporting period)?	No
Used for EBM?	No
ELWD product?	No
Number of managers	0
Description/Names of managers	NA
Reported in previous year?	No

Christine Stawitz

March 8, 2017

Project Update Narrative: NMFS/Sea Grant Fellowship: E/I---24 --- Population and Ecosystem Dynamics --- Evaluating the importance of growth variation in marine fish population dynamics and stock assessment

As part of this fellowship, my proposed objectives were to conduct a two---part study on the relative importance of somatic growth to:

1. Quantify the relative effects of several growth and recruitment variability patterns on production across different life history archetypes.
2. Evaluate the consequences of growth variation on management reference point and growth parameter estimates under alternative life histories and fishing pressures.

Below I detail the progress I have made over the following year on both of these proposed objectives. In summary, I am progressing towards completion of both of these objectives in the next year, during which I intend to defend my PhD. I have nearly completed the first objective and have made substantial progress on the second objective

Part I: Quantify the relative effects of several growth and recruitment variability patterns on production across different life history archetypes.

Activities carried out:

In this study, we projected population responses to realistic fluctuations in growth and early life history for eight fish species that spanned a gradient of life history traits (Table 1). First, we quantified characteristics of time series (i.e. autocorrelation, variance) of compiled recruitment (Stachura et al. 2014) and somatic growth (Stawitz et al. 2015) anomalies (deviations from average levels), which were then used to simulate recruitment and growth trajectories. These patterns were then combined with a standard age---structured population model to evaluate how variability in each rate is transmitted as variability in population biomass and production. Three alternative variation scenarios across three harvest scenarios were run for each species: 1) growth variability only, 2) recruitment variability only, and 3) growth and recruitment variability. By alternatively stabilizing each process, we quantified the relative contribution of each to population productivity.

Participants: My primary collaborator in this work was my advisor, Dr. Timothy E. Essington of the School of Aquatic and Fishery Sciences at the University of Washington. I also worked with Dr. Trevor A. Branch of UW and Dr. Melissa A. Haltuch and Dr. Anne B. Hollowed of NOAA Fisheries.

Results: We found that somatic growth variability often has at least as much influence as recruitment on marine fish population dynamics (Figure 1). This counters the widely held notion that recruitment variation is the primary cause of fluctuations in fish biomass (Hjort 1914, Cushing 1982). Our results suggest that the relative effect of different types of demographic variation on population variability

differs across species. Unexpectedly, we did not find strong correlations between life history characteristics and the importance of different processes (Figure 2). Rather the magnitude and autocorrelation of variation time series were more influential towards how each process drives productivity. More severe age truncation (through fishing) did increase the impact of recruitment variation on biomass variation, as expected, but either did not affect or decreased the effect of growth variation on biomass variation.

In the past year, this work has been submitted for publication to the journal of Animal Ecology. Despite favorable reviews (two rounds), the paper was not accepted for publication. I am working on making minor modifications to the text and the analysis and intend to submit a revised manuscript to a specialized journal during this year.

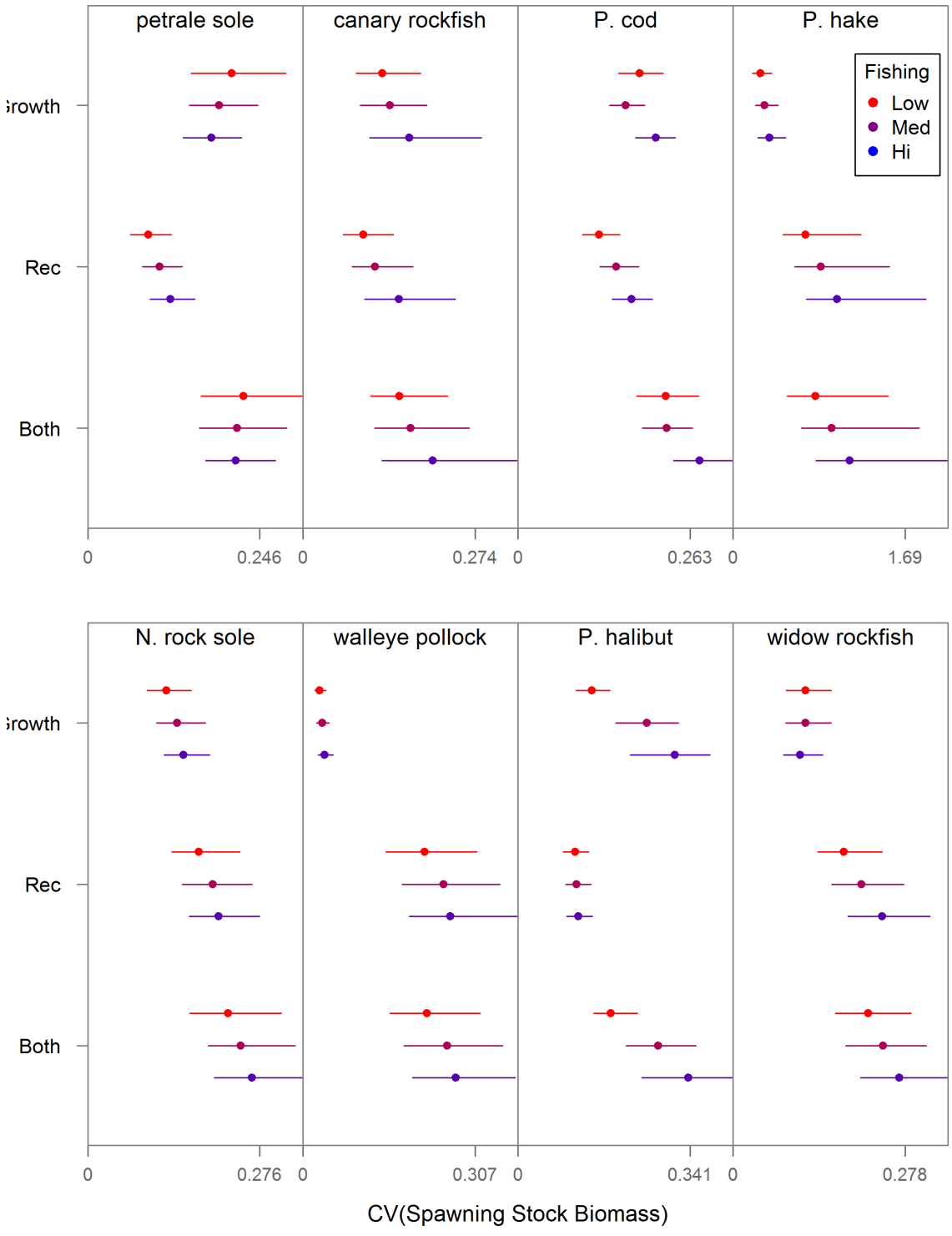

Figure 1 - 95% quantiles (lines) and medians (points) of spawning stock biomass CV across three harvest rates. "Growth" denotes scenarios with growth variation only, "Rec" denotes scenarios with recruitment variation only, and "Both" denotes scenarios with both types of variation.

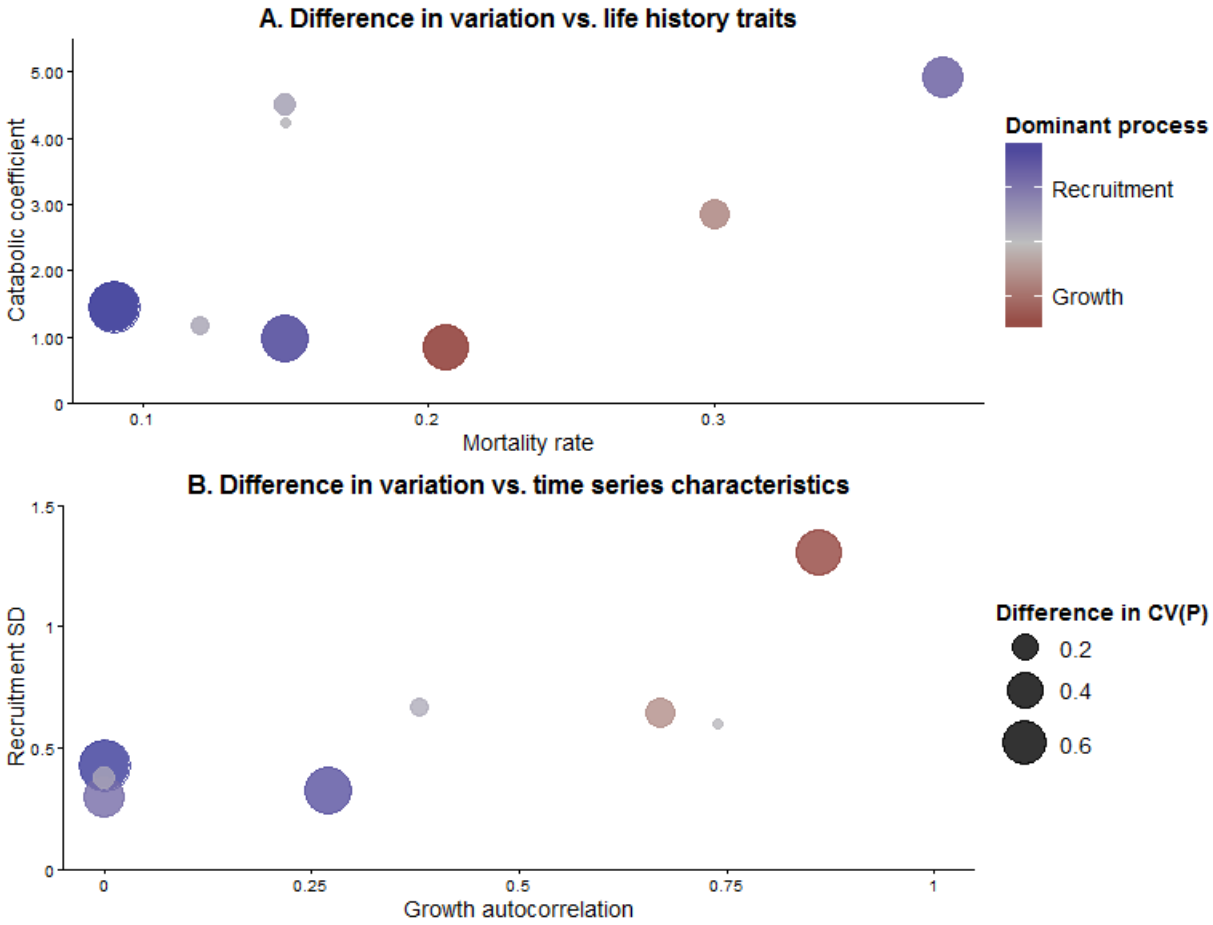

Figure 2- Colors and bubble size indicate relative dominance of growth (purple) or recruitment (red) variation (as measured by the difference of the median output CVs of annual production under medium harvest), against (a) the catabolic coefficient (A) compared with mortality rate (M) and (b) the standard deviation of recruitment deviations compared with autocorrelation of growth deviations.

Challenges encountered: None significant.

Changes in project direction: None, this is exactly what I proposed.

Part II: Evaluate the consequences of growth variation on management reference point and growth parameter estimates under alternative life histories and fishing pressures.

Activities carried out: I have worked closely with Melissa Haltuch, my NMFS mentor, on this project. I have a running version of the model working in SS3, and have identified the main model runs. Species life history characteristics have been selected.

Participants: I am working with Dr. Timothy E. Essington and Dr. Melissa A. Haltuch, my NMFS mentor, on this project.

Results: All results are preliminary, but most of the challenging programming work has been completed so that the main model runs only need to be performed. In expect this work to be completed by summer of Autumn 2017.

Challenges encountered: N/A

Change in project direction: N/A