

INFORMING FOOD SECURITY IN THE ALASKAN ARCTIC

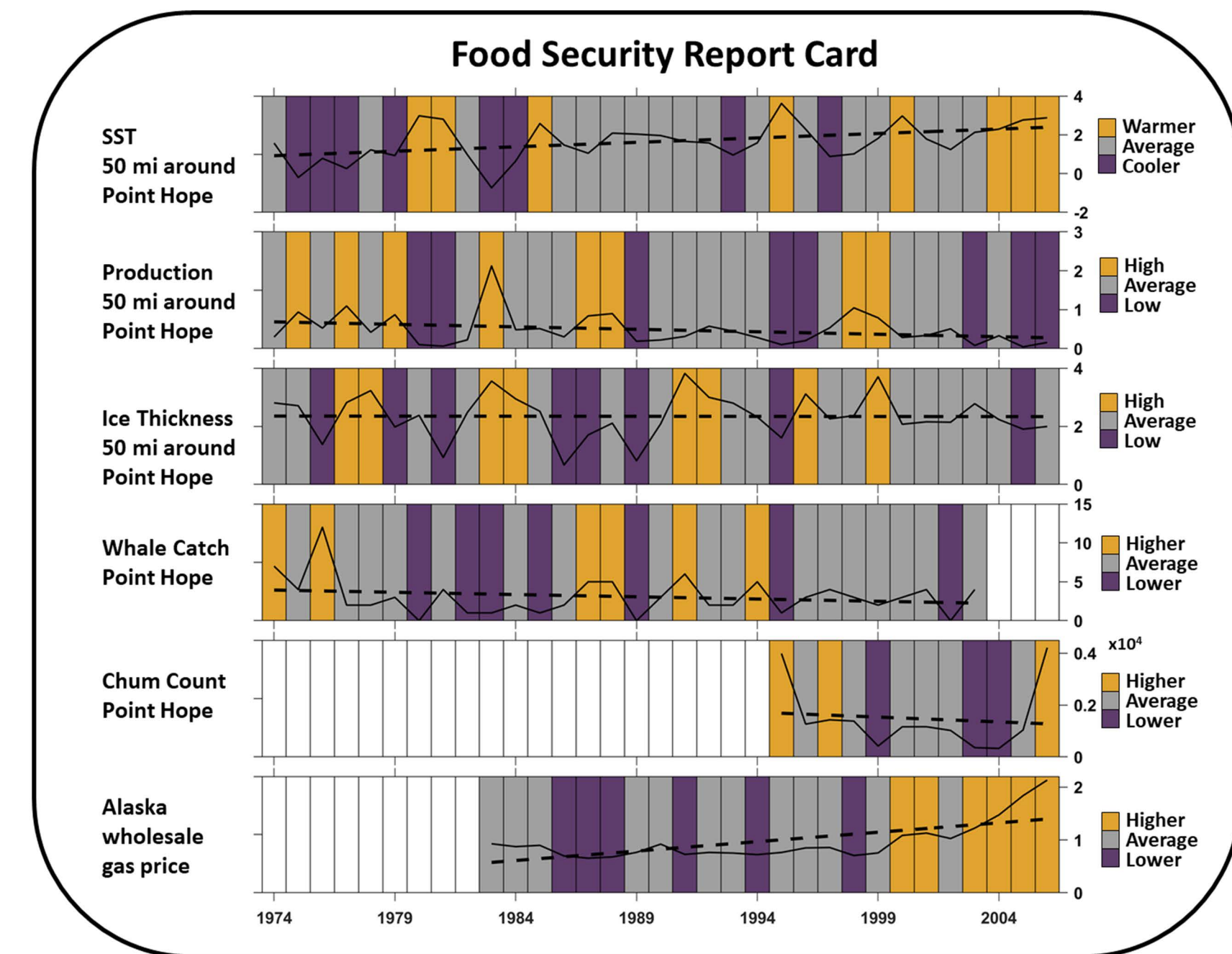
As a cross-component InterFACE collaboration between the RGMA-BGC, the ESMD-BGC and the MSD groups explored how useful Earth System models can be in addressing important food security questions This effort contributed towards subtask **IT2.1**.

WHAT WE DID

We developed Metrics of physical and biological variables that could impact food security in the marine Arctic - guided by Inuit Circumpolar Council Food Security framework's (access, availability, or stability).

WHAT WE FOUND

- Modern models, such as E3SM, can provide estimates of a broad suite of variables relevant to food security
- Metrics developed from Earth System Model output can be combined with relevant, non-model, information sources to give a broader measure of the Arctic food security environment.



Gibson et al., (submitted) How earth system models can inform key dimensions of marine food security in the Alaskan Arctic. ES3.

DISCUSSION

- Our model products are intended as a starting point and a tool for engaging community members, rights holders, and stakeholders and as a way to present, in an accessible way, the model's potential utility in quantifying food security.
- We are hopeful that, with example products in hand, additional model development efforts will have a higher likelihood of success in achieving an iterative discussion with stakeholders in regard to feasible and desired products.

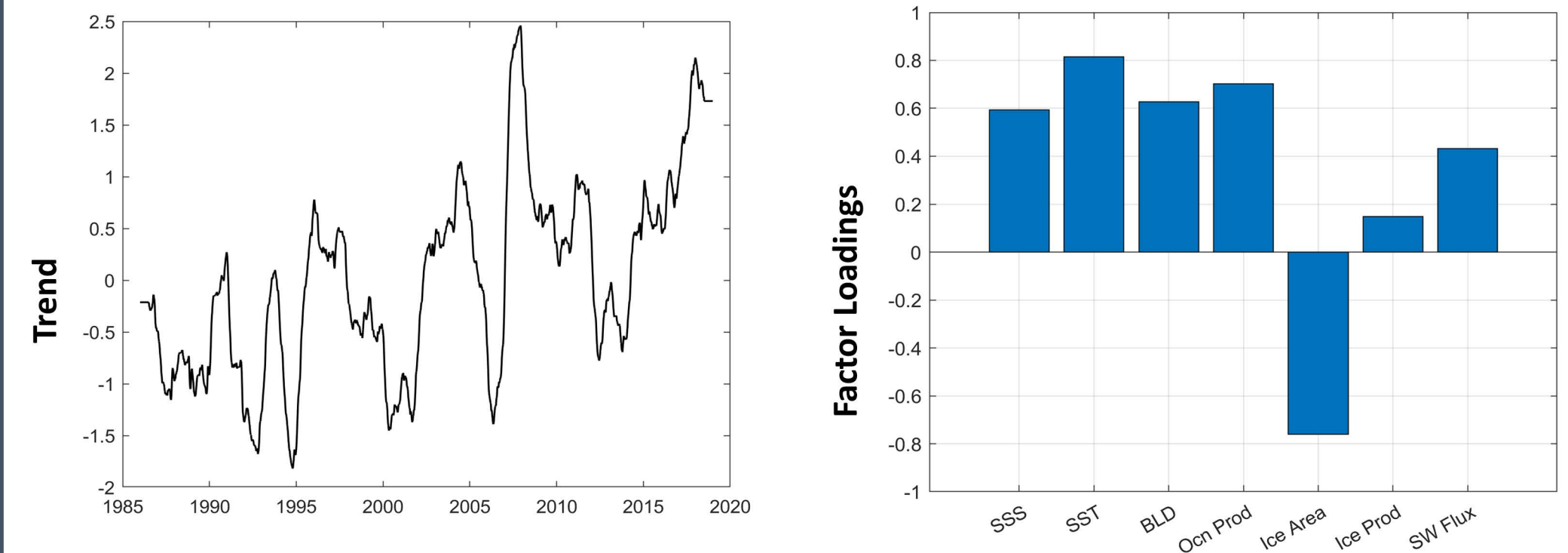
CONTRIBUTING FISHERIES RELEVANT INDICIES

Under Y4 of InterFACE, we are analyzing E3SM outputs to determine the models ability to produce indices for potential inclusion in Ecosystem Assessment Reports for key fisheries.

WHAT WE DID

- Borealization is the northward range expansions and associated ecosystem changes. We are exploring where E3SM could contribute fisheries relevant indices, including a Borealization index.
- Regional metrics were extracted from E3SM-V2.
- Each time series was de-seasoned and normalized using standardization.
- We used factor analysis with one common trend and hypothesized mechanisms to develop a borealization index for the Chukchi Sea.

WHAT WE FOUND



- A single trend, representing borealization, comprises influence from sea surface salinity and temperature, boundary layer depth, ice and ocean primary production and the short wave flux.
- Increasing SST and reducing ice area has a strong positive influence on the borealization factor. Sea ice primary production had the weakest influence.
- Our preliminary analysis shows promise. We will continue to explore a borealization index, along with other model derived indicies, for consideration in marine ecosystem status reports.