EBFM Committee, July 21 meeting

- **Completion and finalizing draft public outreach materials developed by GreenFinStudio**
  - 2nd infographic
  - Stakeholder brochures
  - 4th presentation
- **Tangible worked example demonstration tools, developed by PDT**
  - Hydra – ~20 page plain language document
  - Kraken Visualization tool
  - Stock complex catch management example
- **Committee: Develop Framework and focus of public outreach workshops**
- **Staff: Develop and publish RFP for workshop facilitation.**

EBFM: Tangible Worked Example tools

Andrew Applegate (EBFM PDT Chair)

EBFM Committee meeting
July 21, 2020

Tangible worked example development

Objective

- Comparison of steps to develop catch advice under EBFM approach vs a single species approach, not the outcome
- Demonstration of concept

Approach

- Start simple, add more complexity as needed to demonstrate the concept

MSE (later)

- Comparison of performance of different output controls to achieve desirable objectives.

Tangible Worked Example development

Shiny app and spreadsheet

- Demonstration of decisions of two different management procedures
- Single stock vs. stock complex catch limits

Starting conditions (buttons)

- Equilibrium at MSY, Stressed, Healthy

Stock interaction (predation)

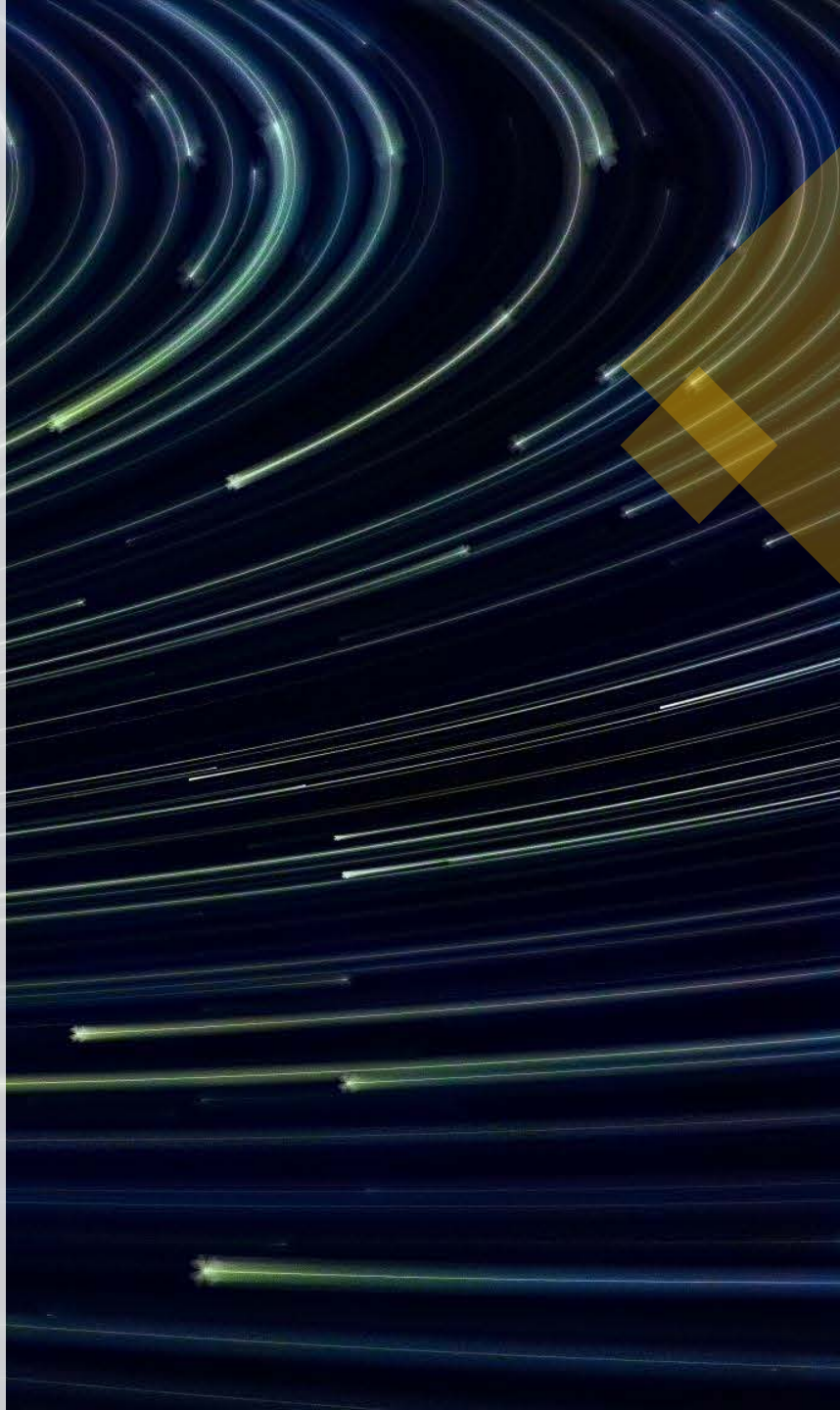
- Instructive via a relative slider (stock A on stock C) –(slider)

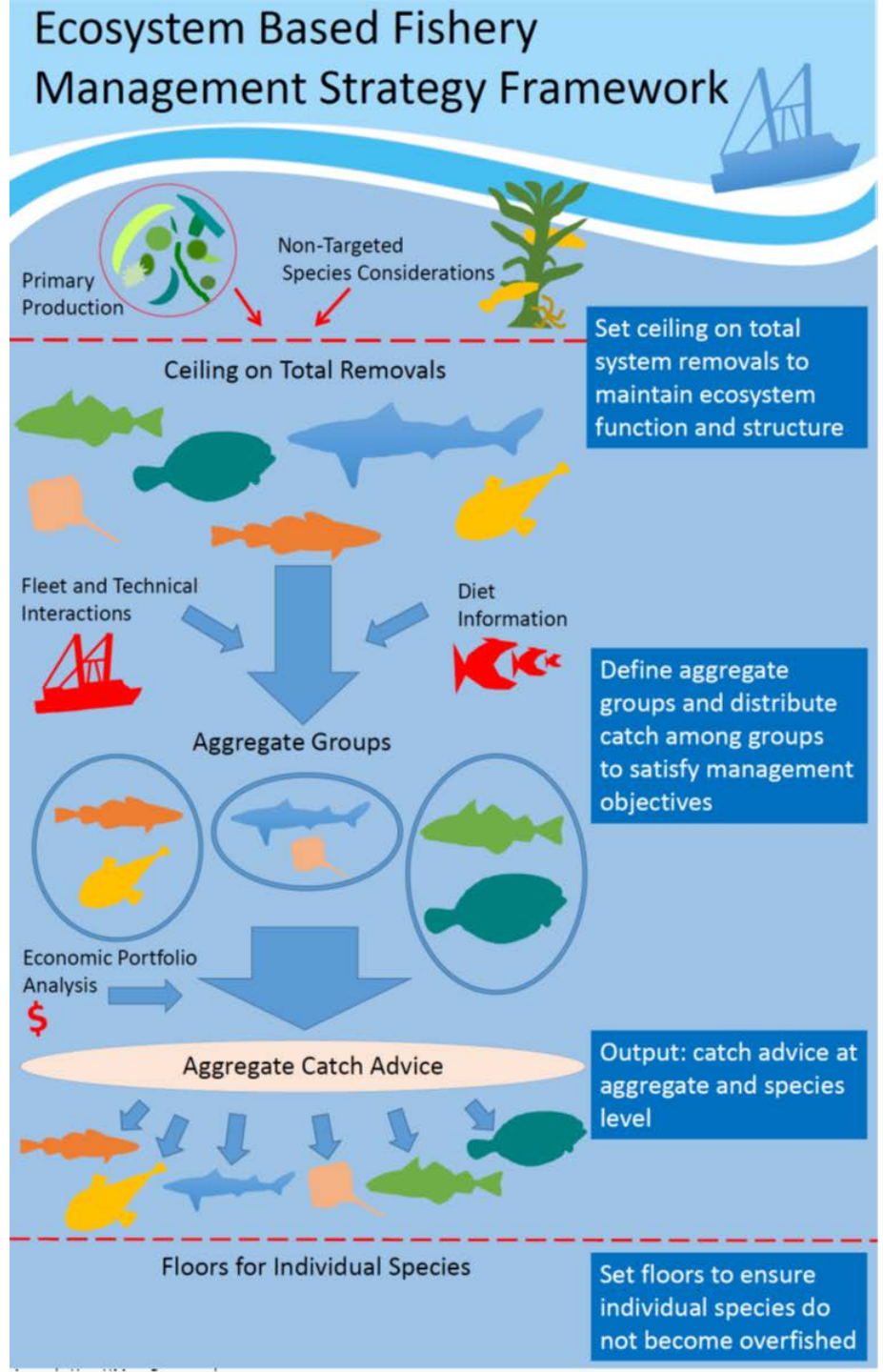
Management uncertainty

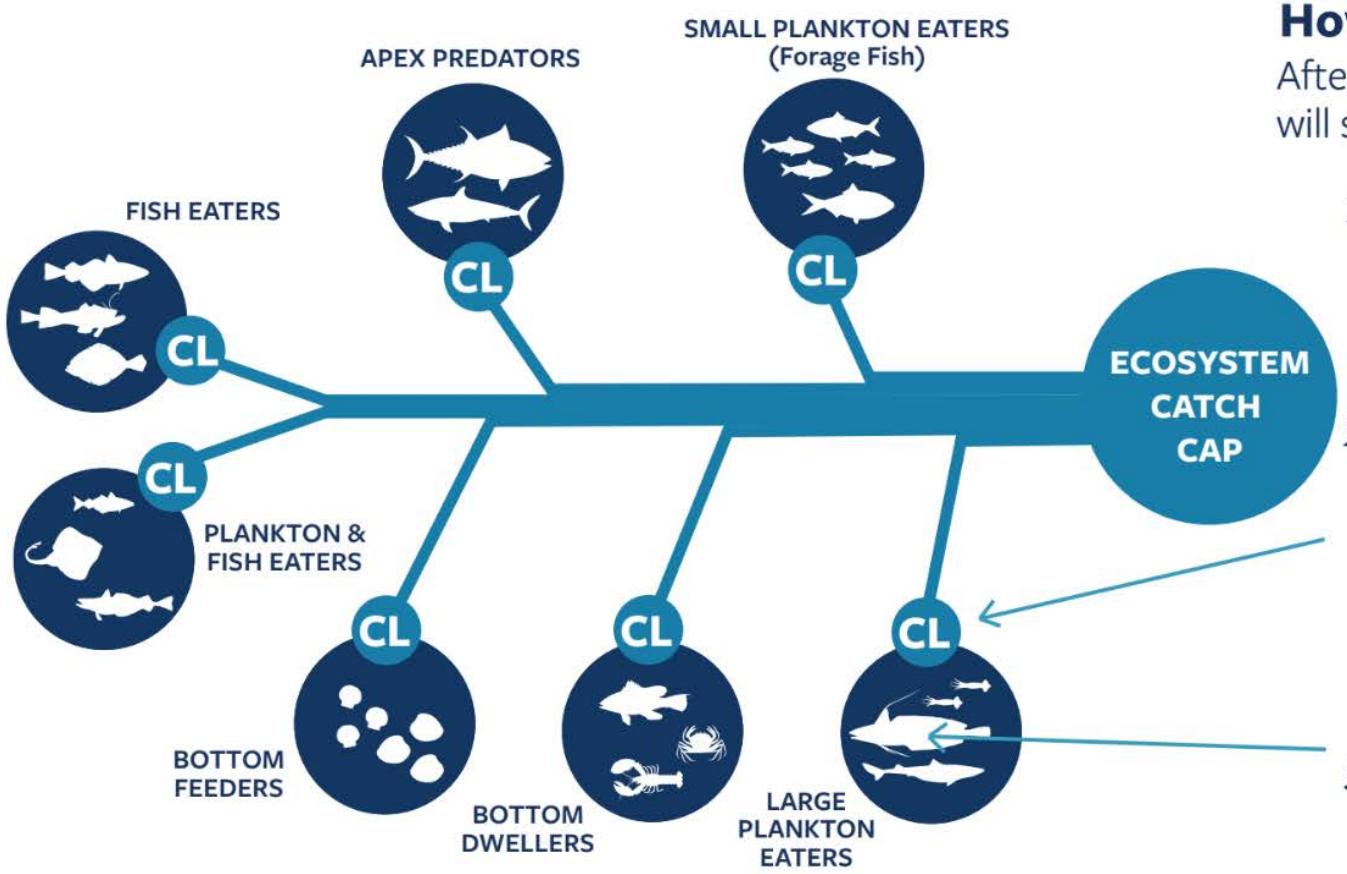
- Mimics maximum retention and/or increase retention through stock complex allocation (slider)

Discarding/fishery selection

- EBFM with higher retention for landings (slider)




Ecosystem Based Fishery Management Strategy Framework
Primary Production
Non-Targeted Species Considerations
Ceiling on Total Removals
Set ceiling on total system removals to maintain ecosystem function and structure
Fleet and Technical Interactions
Diet Information
Aggregate Groups
Define aggregate groups and distribute catch among groups to satisfy management objectives
Economic Portfolio Analysis
$
Aggregate Catch Advice
Output: catch advice at aggregate and species level
Floors for Individual Species
Set floors to ensure individual species do not become overfished



How are EBFM Catch Limits Determined?

After assessing factors of ecosystem health, managers will set three different types of catch limits:

1. *The total ecosystem catch (including unmanaged species) cannot exceed a percentage of primary production, a cap on total ecosystem catch.*

2. *Fish species are grouped into complexes based on similar ecosystem roles. Species complex catch limits(also called ceilings) are determined based on ecosystem health and cannot total more than the ecosystem cap. Catch allocations would be made to fisheries based on the proportion of stock complexes that they catch.*

3. *Each fish species population cannot be fished below levels determined to be critical for survival, the species biomass floors.*

Tangible Worked Example tools

Hydra Model

- Stock complexes, Multifleet
- Biological interactions among 10 stocks
- Harvest control rule, effort based
- Not interactive, multiple iterations

Kraken Visualization Tool

- Stock complexes
- Biological interactions among 10 stocks
- Interactive effort control
  - No harvest control rule, but may run different scenarios and starting conditions
  - Executable program

Demonstration of ecosystem catch advice

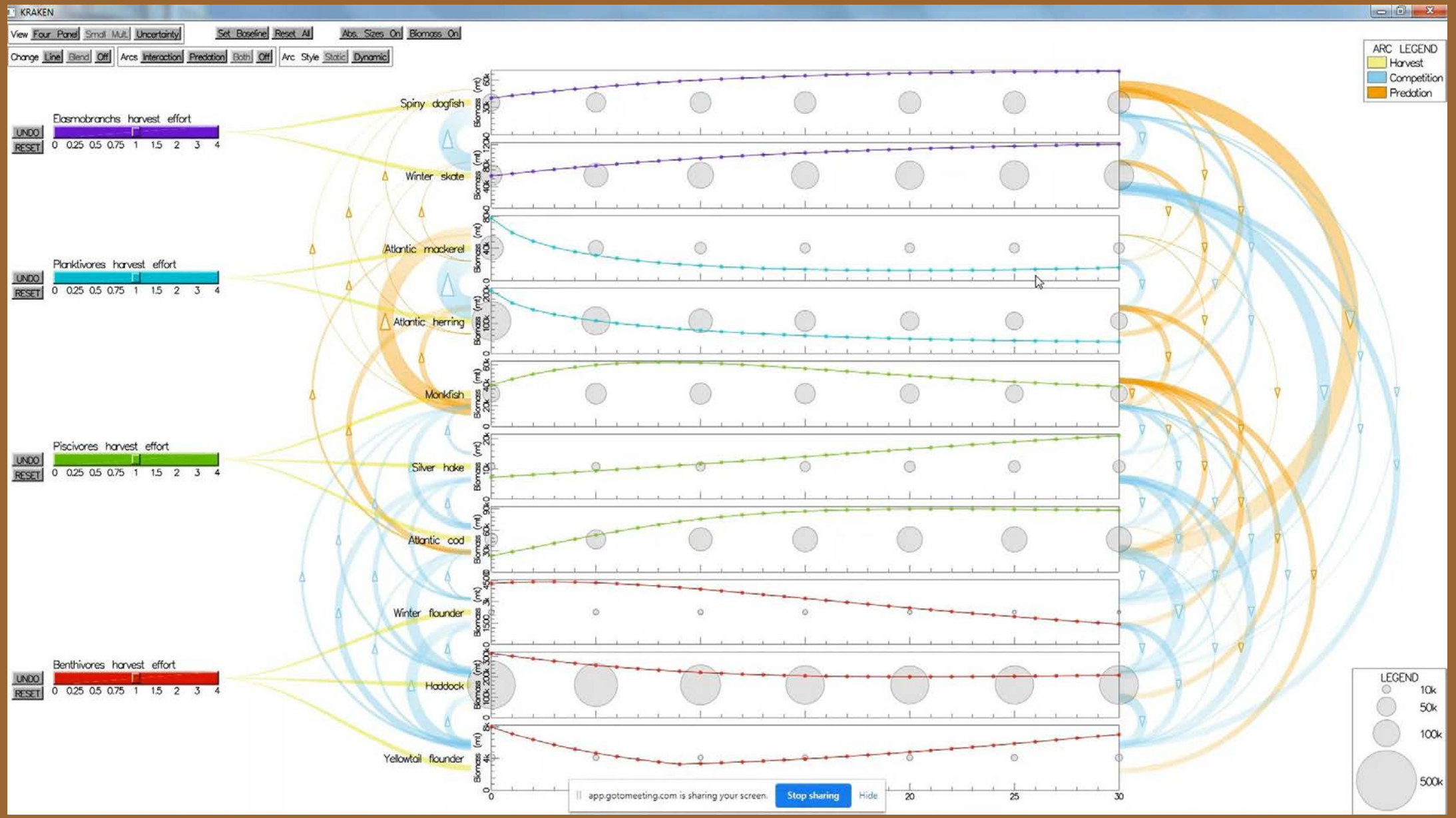
- 2 stock complexes of four hypothetical stocks
- No biological interactions, but this capability is being developed
- Interactive - Catch advice based on fraction of Fmsy
- Applies example harvest control rule
  - Floors for stocks and stock complexes
  - Ceilings for ecosystem and stock complex cap.

Georges Bank Worked Example

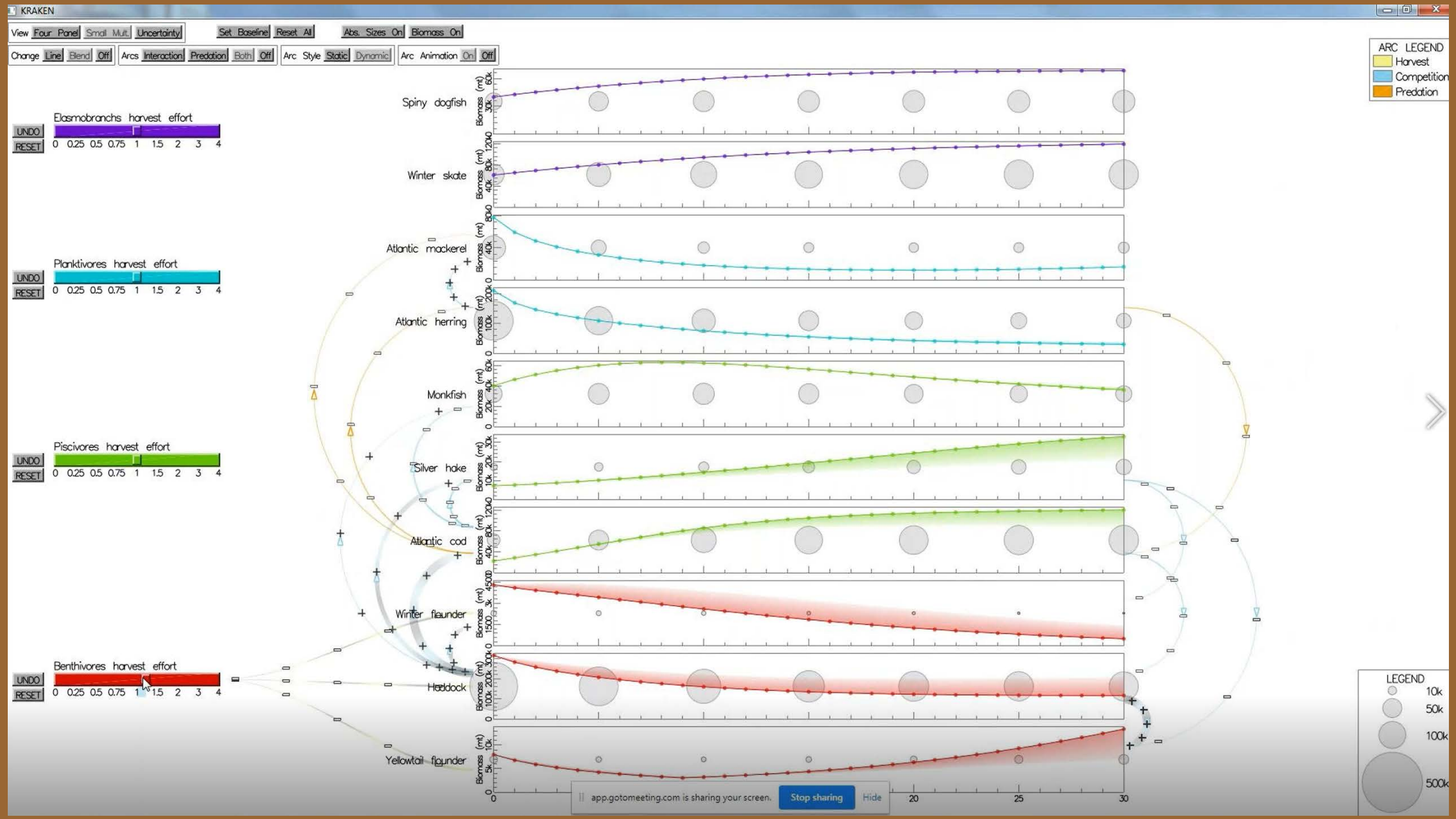
1) Overview
- Why Multispecies Management?
- Introduction to the steps followed in the worked example
2) Identifying the Georges Bank the Spatial Management Unit
3) Identifying Species Complexes
4) Specifying the Management Procedure(s)
- Setting Catches for Species Complexes
- Setting Floors for Species Complexes and Individual Species
- Harvest Control Rules
5) Simulation Testing of Management Procedures
- Hydra Operating Model
- Management Strategy Evaluation
6) Comparison with Single Species Management

Hydra: Length-based, multispecies, multifleet

Kraken visualization tool



Kraken visualization tool



Demonstration of ecosystem-based catch advice

Show data as:
- (•) time series
- ( ) kobe plots

Set catch ceiling?
- (•) Yes
- ( ) No

Assessment type?
- ( ) single species
- (•) stock complex

Target F/FMSY

0 — 0.75 — 1.5

0 0.15 0.3 0.45 0.6 0.75 0.9 1.05 1.2 1.35 1.5

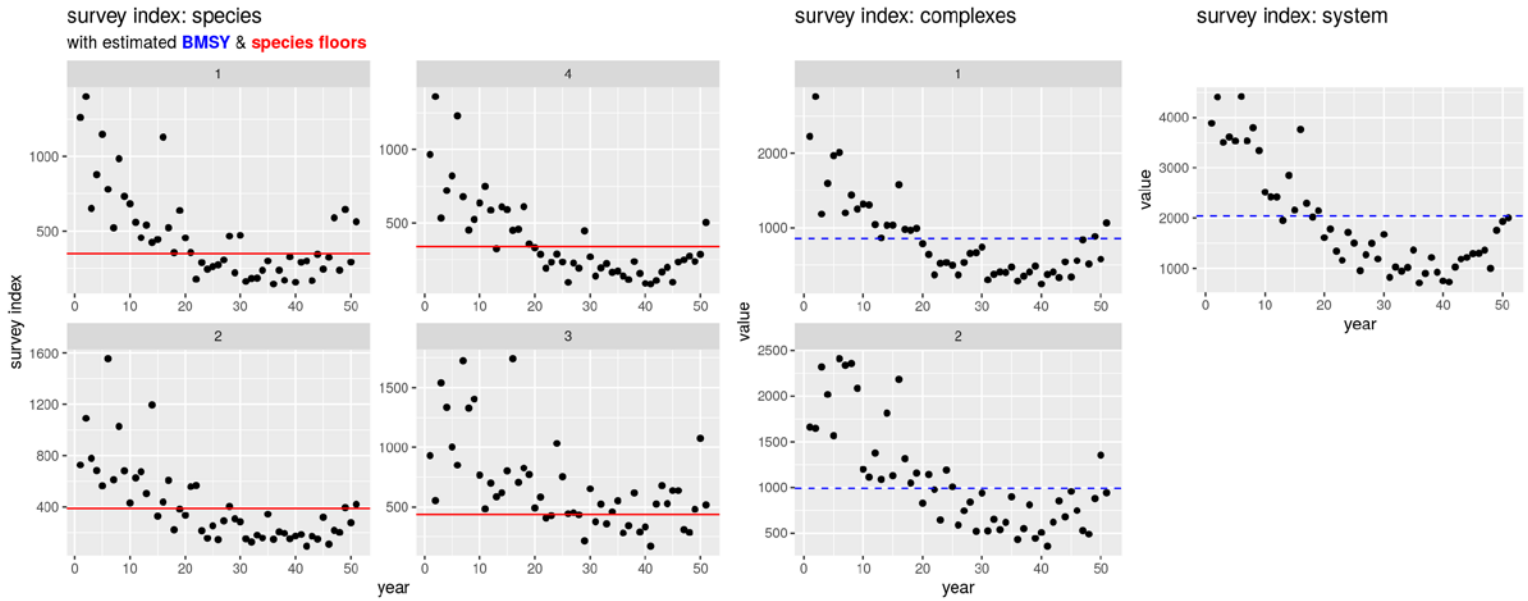
Floor threshold (%max)

0 — 0.25 — 1

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

floor modify with:
- (•) avg status
- ( ) min status

Outcomes



Assessment results & catch advice

complex	fmsy	bmsy	blast	ffmsy	bbmsy	cfmsy	bfloor	fuse	cfuse	ceiling	advice
1	0.15	1,786	1,523	0.68	0.85	226	1	0.11	170	474	170
2	0.14	1,122	1,100	0.48	0.98	149	1	0.10	111	474	111