Small-Mesh Multispecies (Whiting) Data Workshop

Whiting Advisory Panel & Plan Development Team

April 1, 2026

New England Fishery Management Council

2026 Management Actions

Small Mesh Multispecies (Whiting)

Council Priority	Jan – Mar	Apr - Jun	July - Sept	Oct - Dec
Whiting specifications 2027-2031, other management measures	Develop scope	Develop specifications and alternatives, conduct analysis, prepare document Council: initiate action	Council: update on action	SSC: OFL/ABC Council: final action
Exemption areas review and evaluation	Review prior research; evaluate use of LOA; summarize existing measures	PDT/AP Data Workshop		
Risk Policy application	Risk Policy factor development	Risk Policy matrix and identification of data needs	Risk Policy factor scoring	

Updated March 26, 2026, NEFMC Staff

Additional: EFH designation updates and 2027 Council priorities

Risk Policy Workplan Details (Beta Phase)

	January	February	March	April	May	June
Meetings – Input - Decisions						
RPWG: Confirm Factors w/ goal/intent	Jan 23rd					
NEFMC January	Update					
RPWG: Refining Concept			March 9th			
SSC: Check-in			30th			
NEFMC: Check-in, feedback						
RPWG: Refining Concept, Prepare June					TBD	
NEFMC June: Approval, weightings						Decision
Work – Refinement – Implementation						
Support Factor Development • Scoring and Data • Accessibility • Process		**RPWG members and Implementation Team:** Applegate, Miller, Garrison, Peros, O'Keefe oversight				Approval of Concept document
Refine Risk Policy Mechanics • Shape of Curve • Range of Scores • Scaling		**Risk Policy Mechanics sub-group:** Kerr, McNamee, Lawson, Peros, Ware, Brothers, O'Keefe, Miller				Approval of Concept document
Prepare for Weightings exercise						Weightings

Council Risk Policy Update

Beta Phase – setting specifications.

FACTORS

(Key elements to characterize risk)

SCORING (based on recent information) *Objective*	×	**WEIGHTINGS** (level of importance of a factor to the Council) *Policy Choice*	=	**LEVEL OF RISK** (added up across factors)

- Factors are scored by the PDT and weighted by the Council. The results for each factor are aggregated into a "Z-score" for level of risk that is plotted along a curve.

Key Dates for Risk Policy Development & Use

Updates / Refinements	Approval	Use / Implementation
• **Factors & Mechanics** • March 9th – RPWG • March 30th – SSC • April – NEFMC	• **Revised Concept & Weightings Exercise** • June – NEFMC	• **Groundfish,** • **Small Mesh, Scallops** • October - SSC • December – NEFMC • **Herring use HCR*

New England Fishery Management Council

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2026 Risk Policy - FMP Implementation

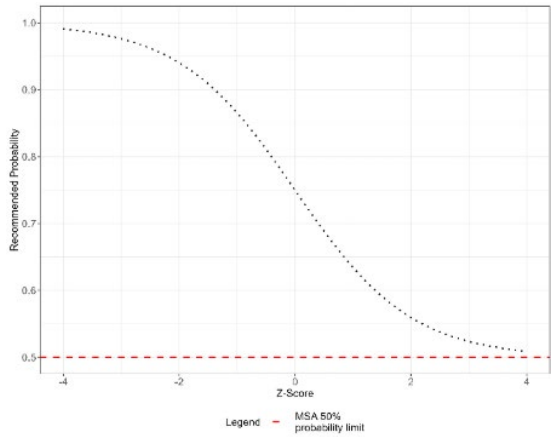
Some standardization, but will not be the same for all FMPs/Actions

- **Groundfish Specifications.** Risk Policy integration with revised ABC CRs (FW68) for specs.
  - Supported by IRA #1, UMaine.
- **Small Mesh Specifications.** Risk Policy integration with current ABC CR (p*) for specs.
  - Supported by Mr. Andy Applegate, small-mesh PDT.
- **Scallop Specifications (OFL / ABC).** Potential for Risk Policy integration with current ABC CR (focus on legal limits, p*). Risk Policy scoring / weighting / Z-score to inform approach to rotational management, rationale for decision making.
- **Herring Specifications.** Continue to use the current ABC CR – Risk Policy not expected have a direct quantitative application to catch setting. (i.e. will not be linked to ABC CR).
- **Other applications.** Potential to support the Risk / Value assessment discussions for other FMPs.

Mechanics of Risk Policy & Implications

- To be proposed: Revised Z-score logistic curve and scoring rubric

Shape of the Curve



Z-Score Scaling

$$p(Z) = \frac{0.5}{1 + e^{Z}} + 0.5$$

$$Z = \sum (w_i s_i)$$

Range of Scores

- The shape of the curve, and scaling of scores, are interrelated concepts that impact the outcomes of the Risk Policy, and how it integrates with ABC CRs.

Scoring Factors – What to Expect, Guidance

- **SSB / Stock Status:** Guidance for analytical assessments is not expected to change, some recommendations from UMaine team for model-free approaches that will be considered.
- **Recruitment:** Quantile approach is being documented, will supply PDTs with Excel sheet.
- **Climate Vulnerability:** The scoring guidelines will provide PDTs with climate vulnerability scores.
- **Commercial Fishery Characterization:** Considering changes to questions and data.
- **Recreational Fishery Characterization:** Considering changes to questions and data.
- *Scoring and scoring guidelines currently under development*

New rubric: Five Factor Approach for 2026

Lower Risk Tolerance ← → Higher Risk Tolerance

FACTOR	-4	-3	-2	-1	0	1	2	3	4
SSB / Stock Status	Below threshold		<75% but above Threshold		Neutral		Rebuilt		Well Above Target
Recruitment	Persistent Low Recruitment		Recent Low Recruitment		Average, No Trend		Recent Large Year Classes		Multiple Large Year Classes
Climate Vulnerability	High Negative Direction	High	Moderate, Negative Direction	Moderate	Low				
Commercial Fishery Characterization					Minimal stress	Low stress	Moderate stress	Elevated stress	High stress
Recreational Fishery Characterization					Minimal stress	Low stress	Moderate stress	Elevated stress	High stress

Lower Risk Tolerance

Higher Risk Tolerance

FACTOR	-4	-3	-2	-1	0	1	2	3	4
SSB / Stock Status	Below threshold		<75% but above Threshold		Neutral		Rebuilt		Well Above Target

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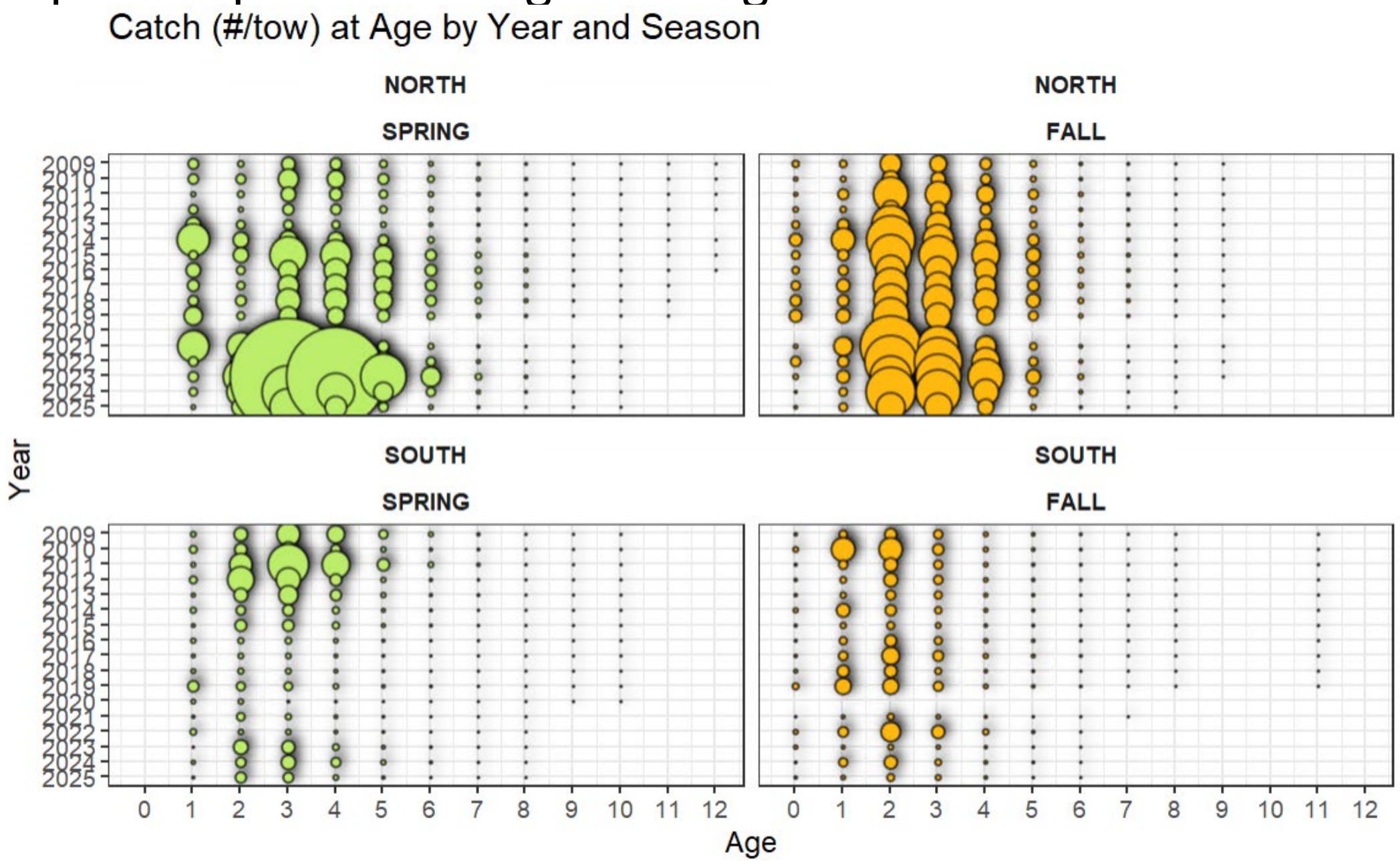
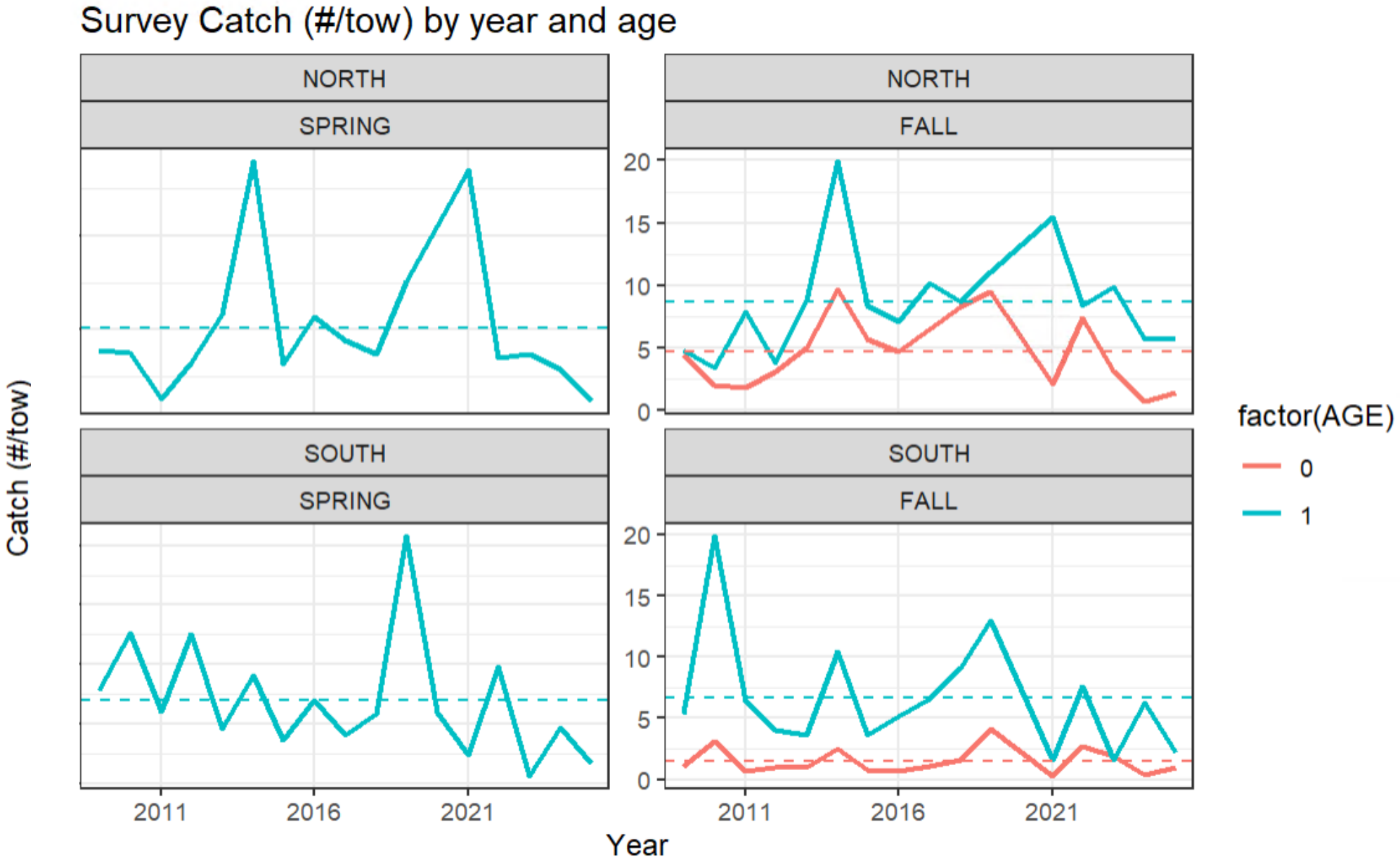
Recruitment	Persistent Low Recruitment		Recent Low Recruitment		Average, No Trend		Recent Large Year Classes		Multiple Large Year Classes

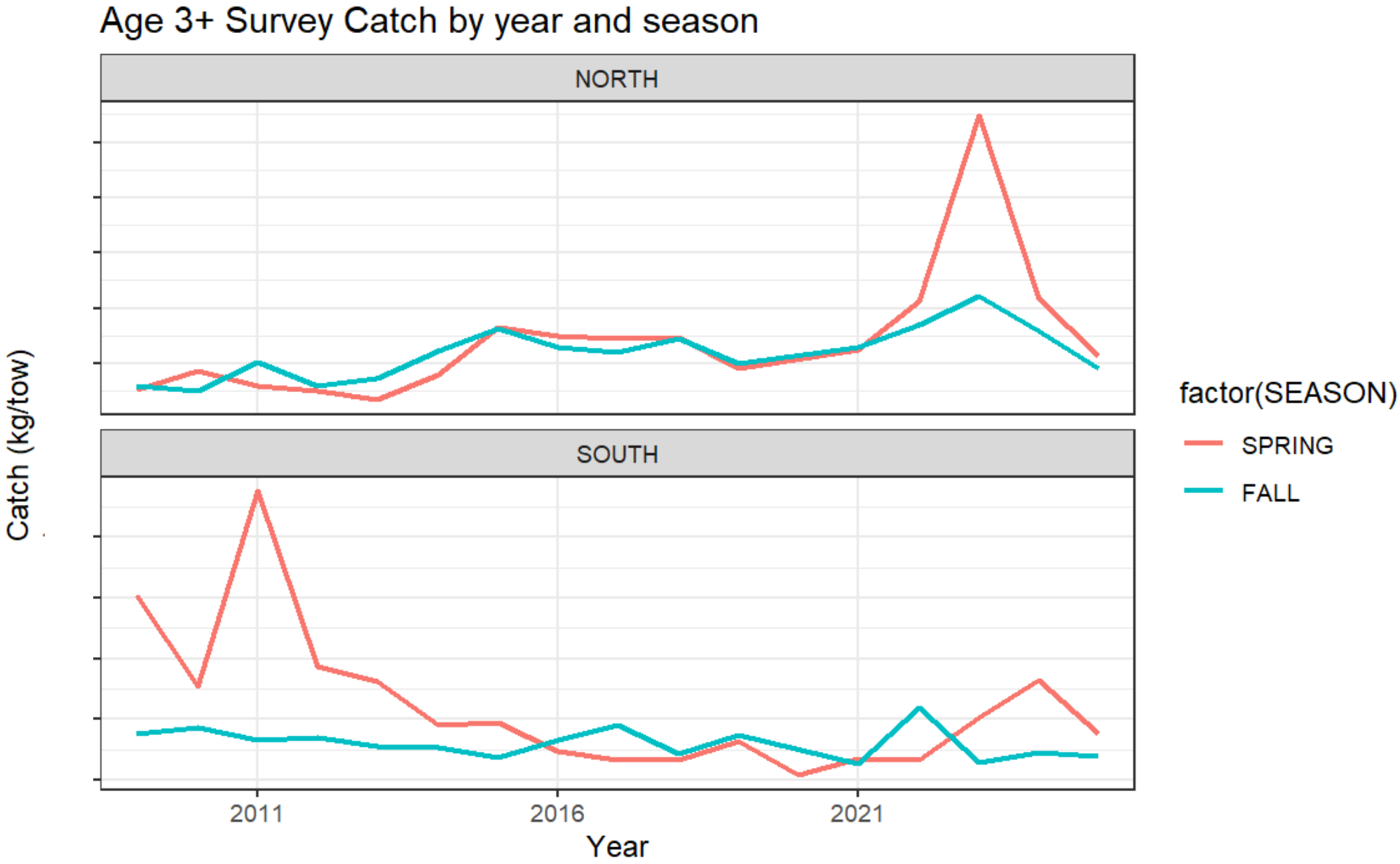
Example for species that ages at length are determined



Example Recruitment trend



Example Spawning Biomass trend



Climate Vulnerability Scoring Guidance:

Lower Risk Tolerance ← → **Higher Risk Tolerance**

FACTOR	-4	-3	-2	-1	0	1	2	3	4
Climate Vulnerability	High Negative Direction	High	Moderate, Negative Direction	Moderate	Low				

FMP	Fish Stock	Biological Sensitivity	Climate Exposure	Climate Vulnerability	Directional Effect	Score	Score Cat
Scallops	Atlantic Sea Scallop	High	High	High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Atlantic Halibut	High	High	High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Ocean Pout	High	High	High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Atlantic Wolffish	High	High	High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Witch Flounder	High	High	High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Cusk	High	High	High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Winter Flounder	High	Very High	Very High	Negative	4	High Vulnerability, Negative Direction
Groundfish	Acadian Redfish	Moderate	High	Moderate	Negative	2	Moderate Vulnerability, Negative Direction
Groundfish	Atlantic Cod	Moderate	High	Moderate	Negative	2	Moderate Vulnerability, Negative Direction
Groundfish	White Hake	Moderate	High	Moderate	Negative	2	Moderate Vulnerability, Negative Direction
Groundfish	Pollock	Moderate	High	Moderate	Negative	2	Moderate Vulnerability, Negative Direction
Groundfish	Haddock	Low	High	Low	Negative	1	Moderate Vulnerability
Groundfish	Yellowtail Flounder	Low	High	Low	Negative	1	Moderate Vulnerability
Groundfish	American Plaice	Low	High	Low	Negative	1	Moderate Vulnerability
Groundfish	Windowpane	Low	High	Low	Neutral	0	Low Vulnerability
Herring	Atlantic Herring	Low	High	Low	Negative	1	Moderate Vulnerability
Monkfish	Monkfish	Low	High	Low	Neutral	0	Low Vulnerability
Skates	Thorny Skate	High	High	High	Negative	4	High Vulnerability, Negative Direction
Skates	Barndoor Skate	Moderate	High	Moderate	Negative	2	Moderate Vulnerability, Negative Direction
Skates	Smooth Skate	Moderate	High	Moderate	Negative	2	Moderate Vulnerability, Negative Direction
Skates	Rosette Skate	Moderate	High	Moderate	Neutral	1	Moderate Vulnerability
Skates	Winter Skate	Low	High	Low	Negative	1	Moderate Vulnerability
Skates	Little Skate	Low	High	Low	Negative	1	Moderate Vulnerability
Skates	Clearnose Skate	Low	High	Low	Neutral	0	Low Vulnerability
Small Mesh	Silver Hake	Low	High	Low	Negative	1	Moderate Vulnerability
Small Mesh	Offshore Hake	Low	High	Low	Negative	1	Moderate Vulnerability
Small Mesh	Red Hake	Low	High	Low	Neutral	0	Low Vulnerability
Red Crab	Deep-sea Red Crab	Low	High	Low	Neutral	0	Low Vulnerability
Salmon	Atlantic Salmon	Very High	Very High	Very High	Negative	4	High Vulnerability, Negative Direction
Dogfish	Spiny Dogfish	Low	High	Low	Neutral	0	Low Vulnerability

Comm Fishery Factor – Proposed Revisions

1. **Quota Usage:** Has greater than 80% of the quota been caught in at least two of the three last years?
2. **Fishing Community:** Has the number of primary and secondary ports declined by any amount over the last five years?
3. **Value:** Has revenue in the fishery (FMP level) had a declining trend over the last five years? For groundfish, instead consider if stock revenue contributes to 10% or more of overall groundfish fishery revenue?
4. **Constraining stock within FMP or on another FMP:** Is quota for this species limiting the execution of other fisheries?
5. **AP Input:** Do comments from the AP within the current fishing year suggest the above trends still hold (no change), socio-economic health in fishery has improved (move one to right), or socio-economic health in fishery has further declined (move one to left)?

*For every "yes" answer, add -1 to the score

Lower Risk Tolerance ← → **Higher Risk Tolerance**

FACTOR	-4	-3	-2	-1	0	1	2	3	4
Commercial Fishery Characterization					Minimal stress	Low stress	Moderate stress	Elevated stress	High stress

Northern Silver Hake Scoring Sheet

Lower Risk Tolerance ← → Higher Risk Tolerance

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Recruitment	Persistent Low Recruitment		Recent Low Recruitment		Average, No Trend		Recent Large Year Classes		Multiple Large Year Classes
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	Factor	Sub-factors considered; Information sources	Rationale for score	PDT score assignment
Stock Status and Uncertainty	Biomass/Stock Status			
	Recruitment			
Climate and Ecosystem Considerations	Climate Vulnerability			
Economic and Community Importance	Commercial Fishery			
	Recreational Fishery			

Assessment Data Updates

STOCK ASSESSMENT IN THE NORTHEAST

From Data Development to Data Update Approaches

Whiting PDT /AP Meeting

April 1st 2026

Warwick, RI

PURPOSE

- Overview of Stock Assessment Process
- Explain range of tools in the Northeast
- Introduce data update approaches
- Discuss evolution to support management decision

STOCK ASSESSMENT OVERVIEW

- Estimates key population parameters
- Supports catch limits (ABC/OFL) and stock status (overfished /overfishing)
- Turns data into management advice

DATA INPUTS

- Landings and discards
- Survey data (Spring/fall trawl surveys)
- Biological data (age, length, growth, maturity etc)
- Quality + Consistency of data = Strength of assessment

MODEL BUILDING

- Age-structured models (e.g. WHAM, ASAP)
- Estimate biomass, fishing mortality and recruitment
- High detail but resource intensive

- Complex models for data rich stocks
- Production Models for data moderate approaches
- Empirical approaches for data limited stocks

ASSESSMENT TOOLBOX

- Capacity constraints across the region
- Need to meet statutory requirements
- Faster incorporation of new survey + Catch data

WHY EVOLVE?

DATA UPDATE APPROACHES

- Update key inputs without rebuilding full models
- Refresh advice using new survey and catch data
- Improve efficiency and timeliness

WHAT DATA UPDATES REQUIRE

- Reliable survey indices
- Consistent and reliable catch accounting
- Clear link to management decisions
- Ongoing work:
  - Defining what's sufficient to meet support decisions.

LEARNING FROM OTHER REGIONS

- West Coast and Alaska use data update approaches
- International examples (ICES)
- Opportunity to adapt proven methods
- We do not need to reinvent the wheel

NORTHEAST ADAPTATION

- Build a flexible toolbox and process
- Match tools to data and species
- Support regional management needs

- Moving towards a more flexible system that delivers advice while meeting statutory requirements.
- Continued need:
  - Stakeholder input and quality catch data
  - Transparent methods
- Opportunity to:
  - Align science with management needs
  - Improve responsiveness
  - Adaptable to changing resource landscape

WHAT DOES THIS MEAN FOR OUR REGION

Fishery Performance
AP Questions

Discussion: Recent Fishery Performance

- What factors have influenced recent fishing activity and how?
  - Wind farms, environmental change, market pricing, etc.?
  - Regulations in related fisheries (e.g. squid) and relative prices?
  - Recent changes in catch per day fished?
  - Recent changes in bycatch, any ‘hotspots’?
  - Are there any recent market changes affecting whiting prices?
- How might these factors change in the near future? How do you anticipate that the fishery will adjust to these changes? How is the industry adjusting to changes in fish distribution?
- Have any recent regulatory changes in related fisheries affected your small-mesh multispecies fishing and how?
- Are the current small-mesh fishery regulations appropriate? How could they be improved and how would they affect the small-mesh multispecies fishery?
- What other factors may affect the small-mesh multispecies fishery going forward?
- Are there any recreational fishing issues that should be considered?

Domestic Whiting Pricing and Import Analysis

Overview and Purpose

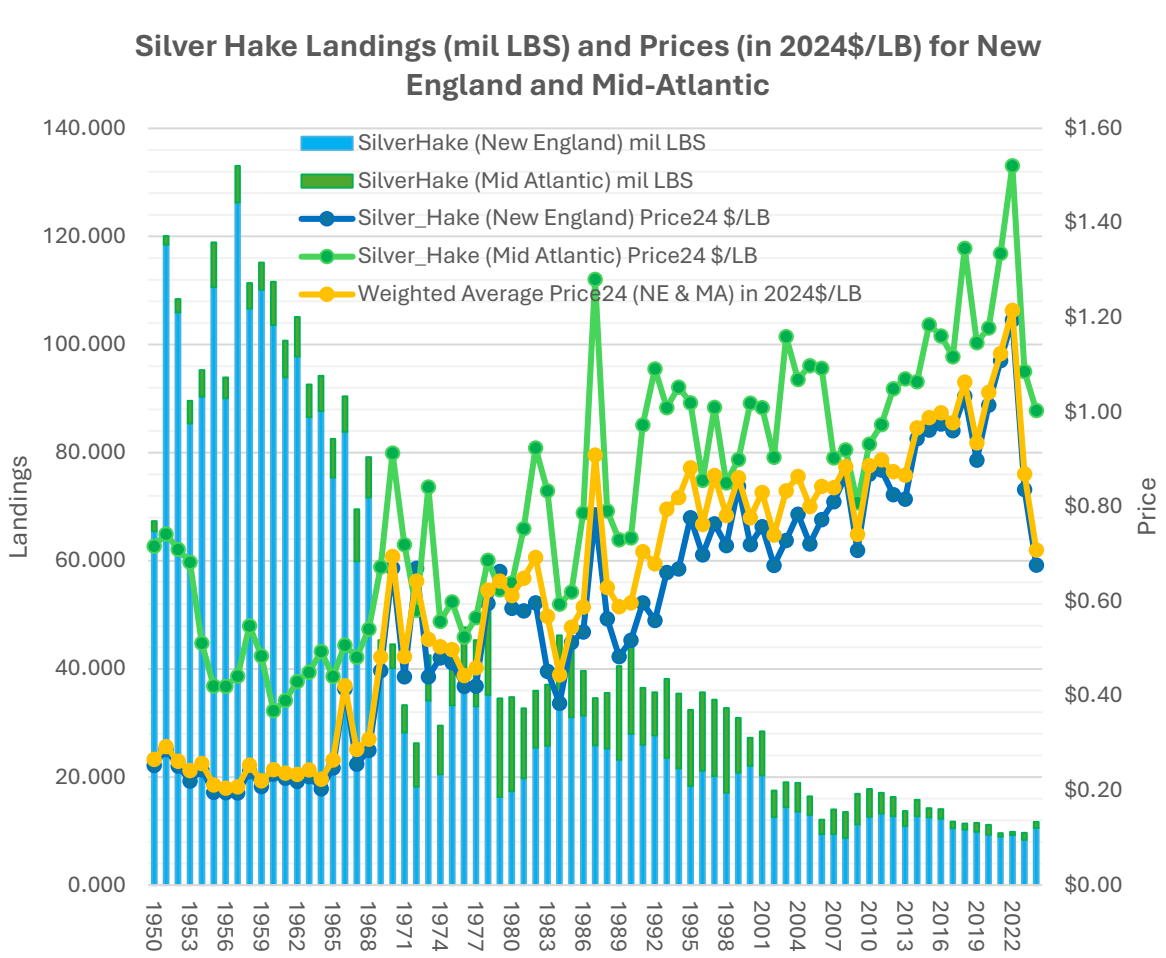
Key Questions Addressed

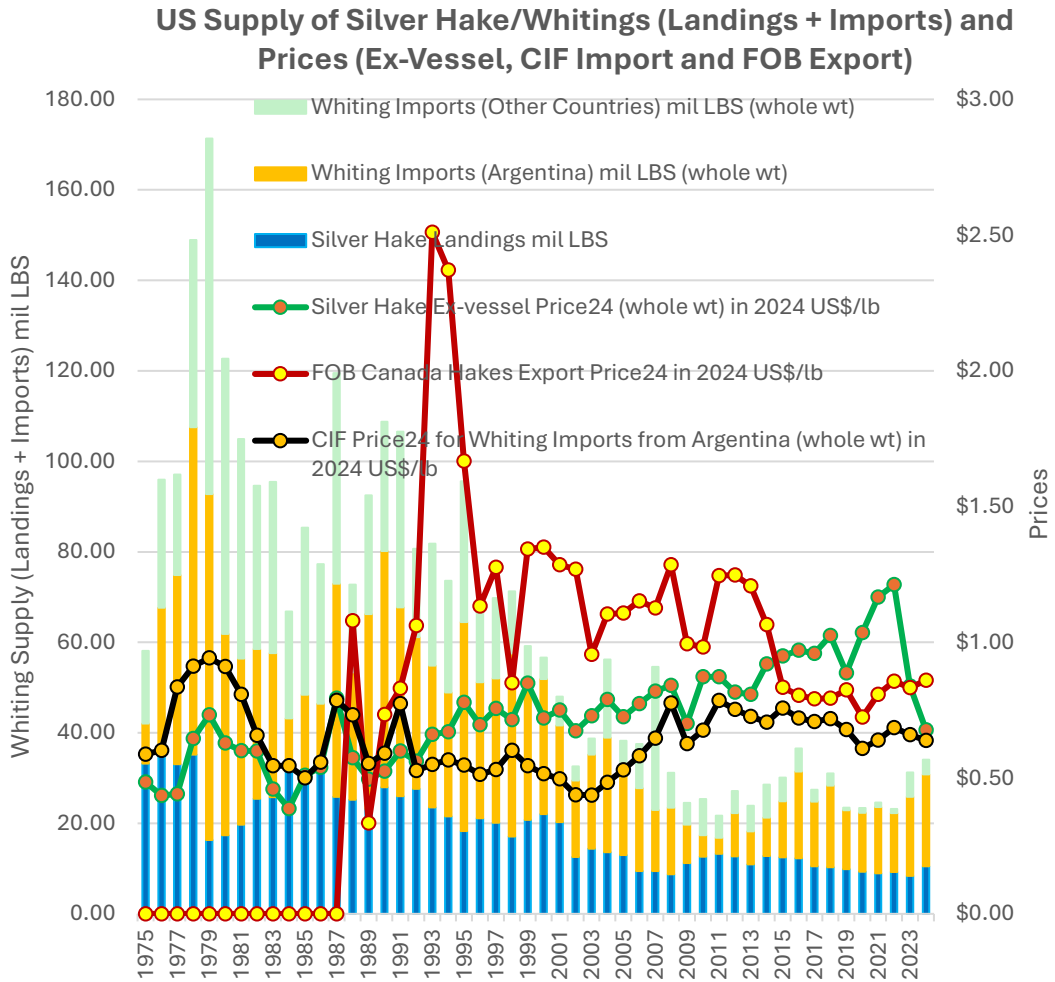
- Concern for a very high price volatility for silver hake during 2020s while its annual landings had been relatively stable
- Tasked to examine price volatility with a strong focus on the role of imports in explaining the sharp price declines in 2023 and 2024.

Conceptual Framework

- Many broad factors that can influence biomass (or landings) and hence, on ex-vessel fish prices. Such factors range from biological/ environments conditions; regulatory/institutional constraints; input costs, market demand shifters/substitutes; macroeconomic variables; technological/infrastructure factors; trade shocks/market structure, etc.
- Inverse relationships between quantity of fish supply (landings and imports) and price

US Supply of Whiting and Prices (Ex-vessel, CIF and FOB)





Landing Trends and Long-Run Price

Silver hake landings (1950–2024) show large long-term declines from historical highs, while Real ex-vessel prices (2024$) increased steadily over the long run but became much more volatile during major economic shock like oil crisis, interest rate shocks and around Covid-19 pandemic.

Hakes/Whiting in Global and Trade Context

Global Production and Trade Scenario

- Six (including silver hake) out of 22 hake species account for 94% of global hake catches, with peak production in the 1970s.
- The U.S. is not a major silver hake exporter but is deeply embedded in the global hake/whiting trade network.

Fig. 1: Hake catches by species 1950–2020.

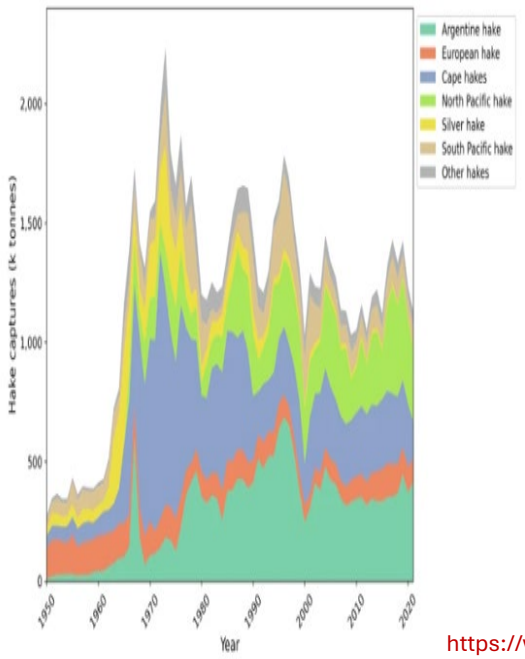
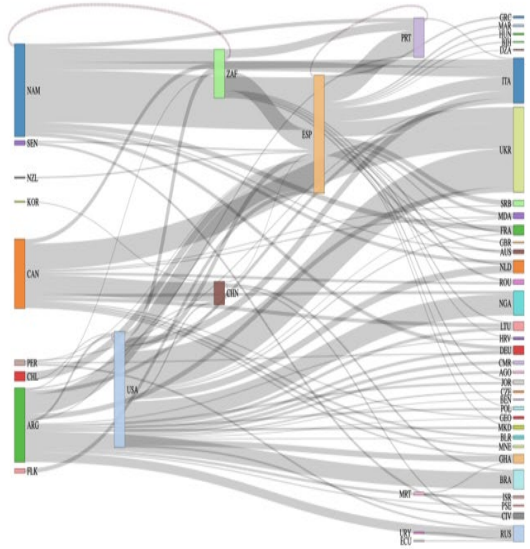


Fig. 5: Sankey diagram of the Global Hake Trade Network for the period 2016–2020.

From: Global hake production and trade: Insights for food security and supply chain resilience



Countries (nodes) are represented by rectangles or text. The size of the rectangle is proportional to the quantity (mass) of hake traded. Arrows or arcs are used to show the flows between them. The diagram shows the 100 largest flows (tonnes) between countries in the world. Countries are represented with the ISO 3166-1 alpha-3 international standard codes. The interactive diagram can be accessed at: https://mares-imedea.shinyapps.io/Hake_Global_Trade_Network/.

Source: Andres et al (2024/Nature)

https://www.nature.com/articles/s44183-024-00083-5#Fig7

U.S. Trade Patterns

- **Imports**
  - The U.S. regularly imports whiting, primarily from Argentina, with additional intermittent shipments from Chile, Ecuador, Uruguay, and China.
  - Total U.S. imports (2024): Hakes: $16 million and Whiting: $15 million
- **Exports**
  - The U.S. exports large volumes of non–silver hake (mainly North Pacific hake) to Europe and Africa valued about $101 million in 2024
  - Silver hake itself is not exported in meaningful volumes.
- **Whiting Imports and Prices**
  - Imported whiting generally enters the U.S. market at lower real prices, expanding total supply.
  - CIF import prices remained relatively stable, fluctuating far less than domestic silver hake prices.

Impacts of Landings, Supply and Imports on Silver Hake Prices

Impact of Silver Hake Landings

Regression results confirm a statistically significant negative relationship:

- Post-2000, prices fall more sharply per unit increase in landings than in the long run.
- Elasticities indicate less than proportional price declines, but still economically meaningful.
- Since 2000:
  - 2.21¢ price decline per additional million lbs. of landings
  - 0.32% decline per 1% increase in landings

Impact of Total Whiting Supply

- Increased total whiting supply (domestic landings + imports) has a statistically significant negative effect on silver hake prices.
- Since 2000:
  - - 0.62¢ price decline per additional million lbs. of supply
  - - 0.26% decline per 1% increase in supply

Impact of Whiting Imports Alone

- Whiting imports have an independent and stronger price-depressing effect in recent years.
- During 2016–2024:
  - - 2.19¢ decline per additional million lbs. of imports
  - - 0.42% decline per 1% increase in imports

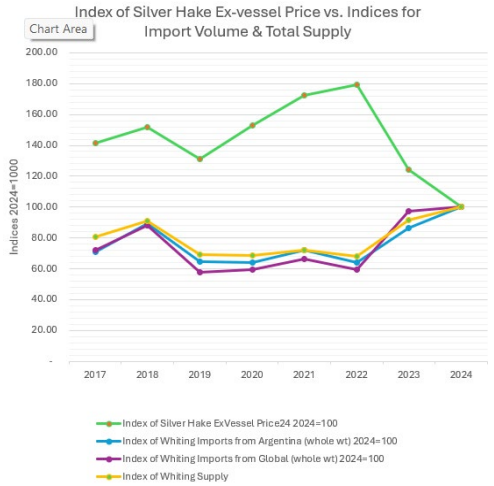
Index-Based Comparisons (2017–2024)

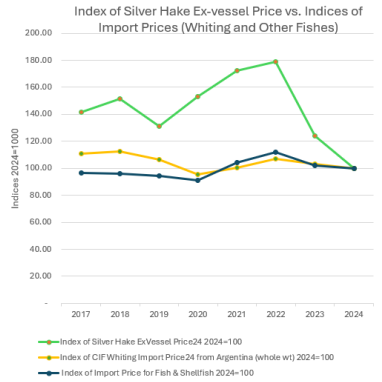
Using 2024 = 100 indices:

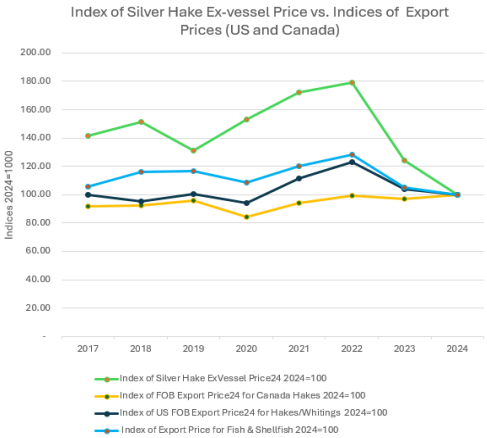
- Silver hake prices peaked in 2022, then fell sharply in 2023–2024
- At the same time:
  - Whiting imports rose ~40%
  - Total whiting supply rose ~30%

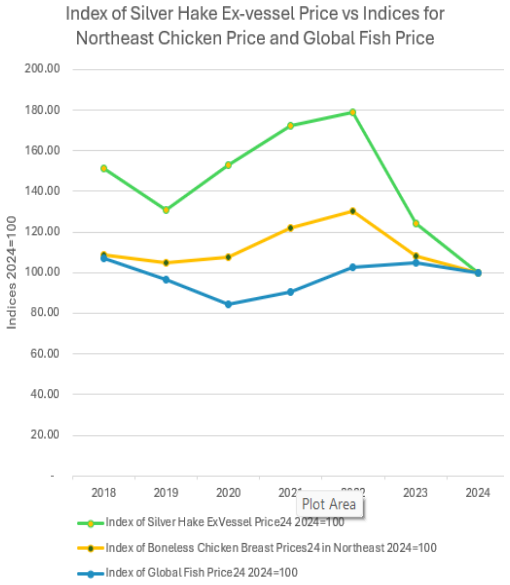
Additional comparisons show:

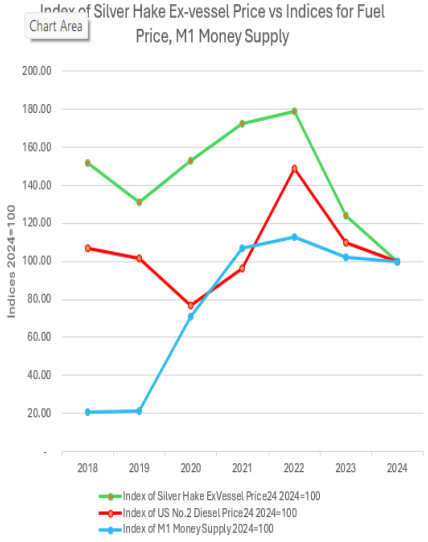
- Import prices declined modestly but were far less volatile than domestic prices
- Export prices for U.S. hakes declined post-2022
- Canadian hake export prices were more stable
- Silver hake prices tracked:
  - Chicken prices (substitute)
  - Global fish prices
  - Diesel fuel prices
  - Money supply growth, especially during the pandemic years











Period	M1 Money Supply Trillion US Dollars
2000-09	1.325
2010-14	2.295
2015-19	3.488
2020	12.820
2021	19.386
2022	20.433
2023	18.546
2024	18.119

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	INDX_SH_PR24	INDX_FUEL_PR24	INDX_M1
INDX_SH_PR24	1.00000 50	0.36453 0.0127 46	0.57375 <.0001 50
INDX_FUEL_PR24	0.36453 0.0127 46	1.00000 46	0.29085 0.0499 46
INDX_M1	0.57375 <.0001 50	0.29085 0.0499 46	1.00000 50

Key Inferences and Conclusions

- An inverse and statistically significant negative relationship exists between silver hake prices and domestic landings, total whiting supply, and whiting imports
- Imports from South America (mainly Argentina) are a major driver of recent silver hake price declines.
- Import prices are less volatile, amplifying downward pressure on prices when volumes increase.
- Fuel prices, inflation, and broader macroeconomic factors also influence prices.
- Price movements across fish markets suggest possible cointegration.
- The sharp decline in U.S. silver hake prices after 2022 is best explained by a surge in relatively low-priced whiting imports interacting with stable domestic landings, broader fish market trends, and macroeconomic forces.

Management Considerations

- **Interpreting Price Signals**
  - Recent price declines appear driven primarily by external supply forces (imports) rather than domestic harvest levels.
  - Low prices do not imply overfishing or excess domestic catch in the silver hake fishery.
  - Price signals may therefore be weak indicators of biological or management performance specific to this fishery.
- **Revenue and Fishery Performance**
  - Increased imports can reduce ex-vessel revenues even when quotas, effort, and biomass are stable.
  - Revenue volatility may affect fleet profitability, crew incomes, or port-level economic outcomes
- **Trade and Market Exposure**
  - U.S. silver hake prices are exposed to global whiting markets, particularly South American supply.
  - Import prices are less volatile, limiting domestic price recovery when supply expands.
  - Market outcomes increasingly depend on trade dynamics outside fishery management control.
  - Economic outcomes and biological outcomes may move independently under globalized markets.

Key Takeaway :

Silver hake price dynamics in recent years reflect global supply conditions more than domestic fishery activity, underscoring the importance of interpreting economic signals within a broader trade and market context.

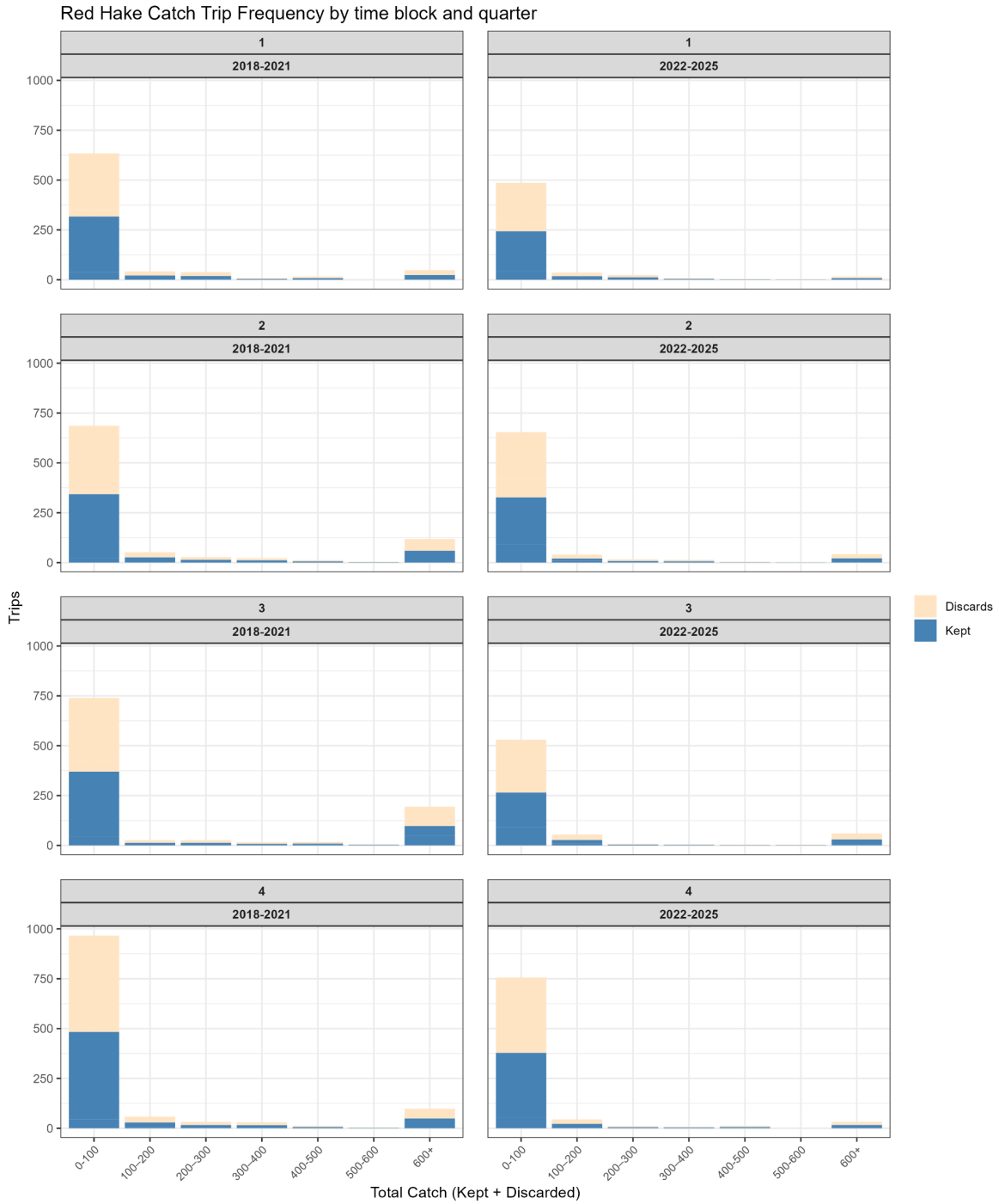
Red Hake Landings and Discards on Observed Trips

Monthly red hake landings and discards by trip

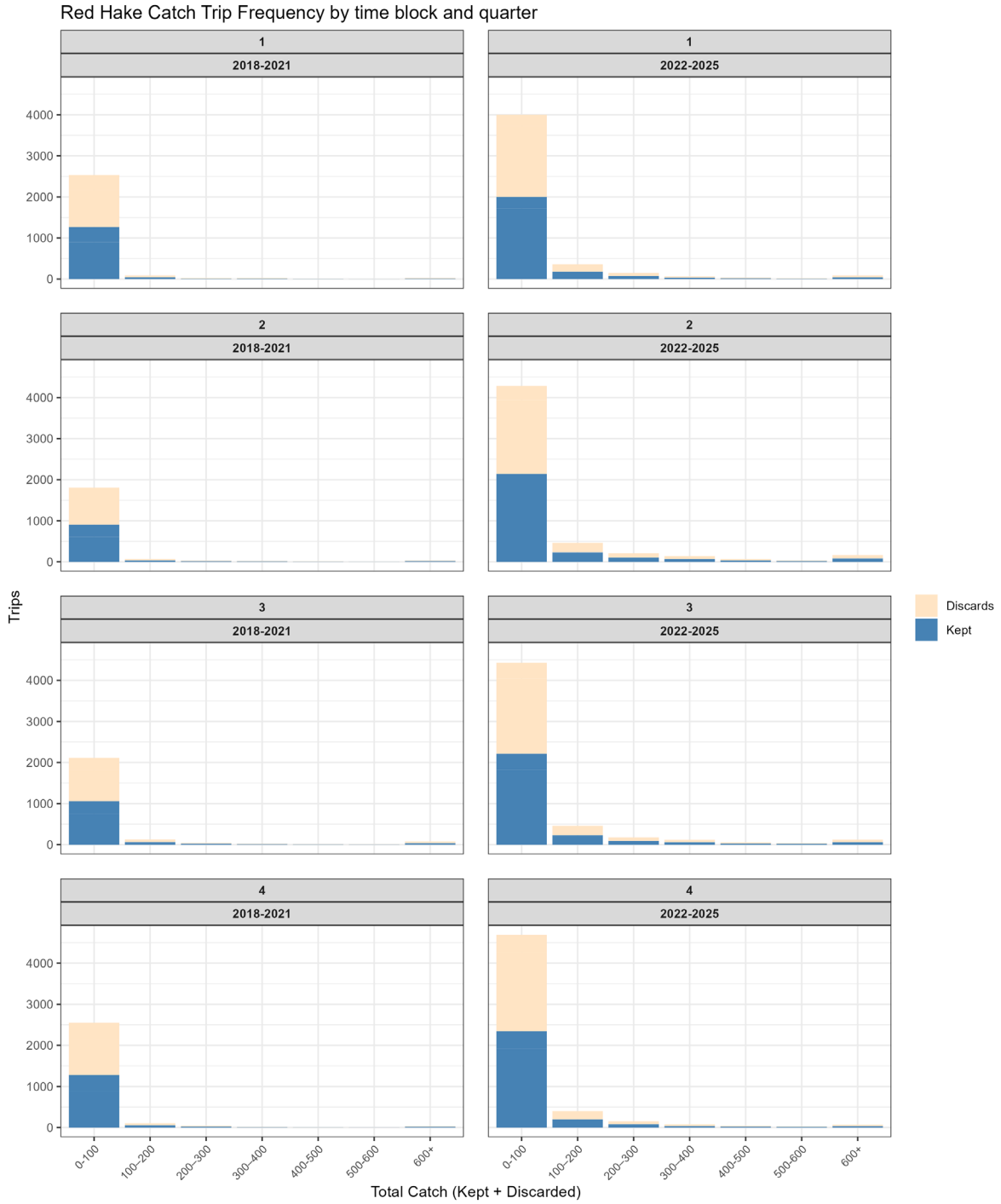
MESH_GROUP	< 5.5 in
AREA	(All)
EXEMPTION_AREA_APPROX	(Multiple Items)

Row Labels	Total red hake landings	Total SMS discards	Ave red hake landings per trip	Ave SMS discards per trip	Vesseks
1994-2021	**522,983**	**766,847**	**338.1**	**495.7**	**555**
1	375	793	5.1	10.9	5
2	0	1,454	0.0	55.9	6
6	1,360	1,828	17.0	22.9	7
7	195,948	130,600	707.4	471.5	139
8	206,825	178,712	506.9	438.0	189
9	60,779	288,565	235.6	1,118.5	87
10	46,917	137,993	222.4	654.0	79
11	8,829	24,459	61.3	169.9	25
12	1,949	2,444	27.8	34.9	18
2022-2025	**6,676**	**57,916**	**96.8**	**839.4**	**63**
1	0	281	0.0	70.1	4
3	0	107	0.0	35.5	3
5	0	155	0.0	25.9	5
6	960	562	120.0	70.2	7
7	653	13,694	65.3	1,369.4	10
8	91	3,879	18.2	775.9	5
9	321	5,689	35.7	632.1	9
10	1,000	20,460	333.3	6,819.8	3
11	2,390	11,487	170.7	820.5	12
12	1,260	1,604	180.0	229.1	5
Grand Total	**529,659**	**824,763**	**327.8**	**510.4**	**618**

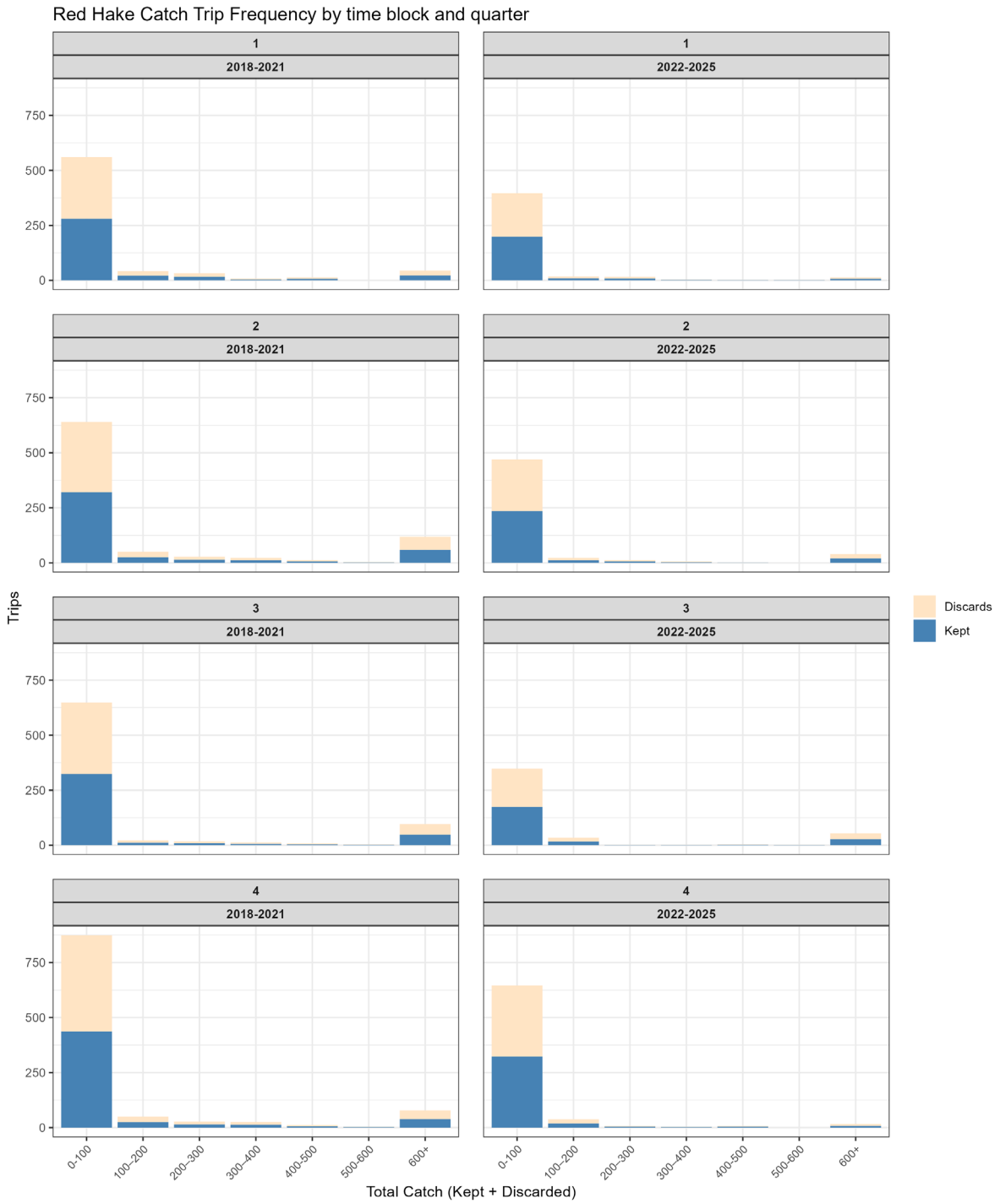
Northern area red hake catch by small-mesh trawls on observed trips



Northern area red hake catch by large-mesh trawls on observed trips



Southern area red hake catch by small-mesh trawls on observed trips



Southern area red hake catch by large-mesh trawls on observed trips