

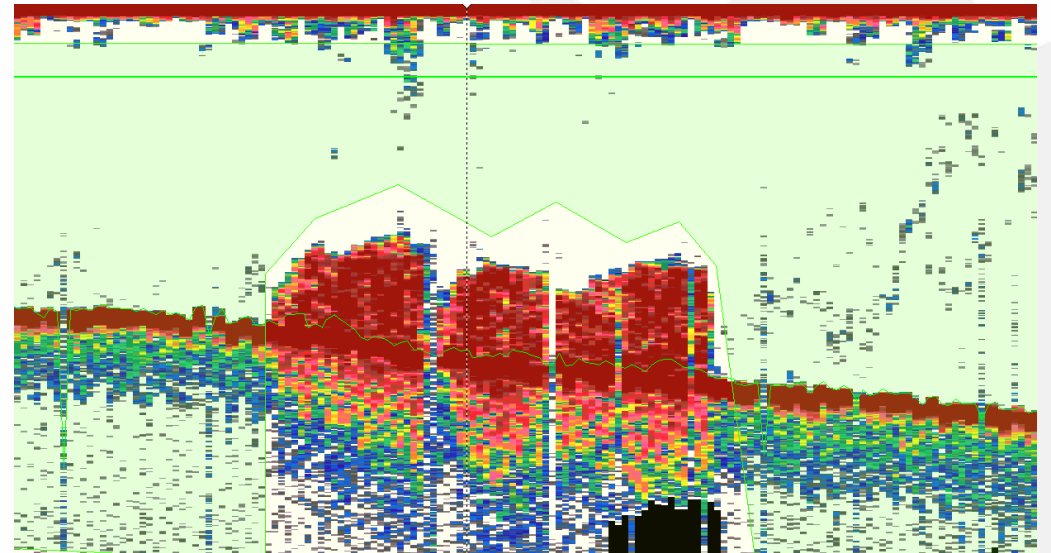


Practices and Practicalities of Gulf Region Herring Acoustic Survey Design



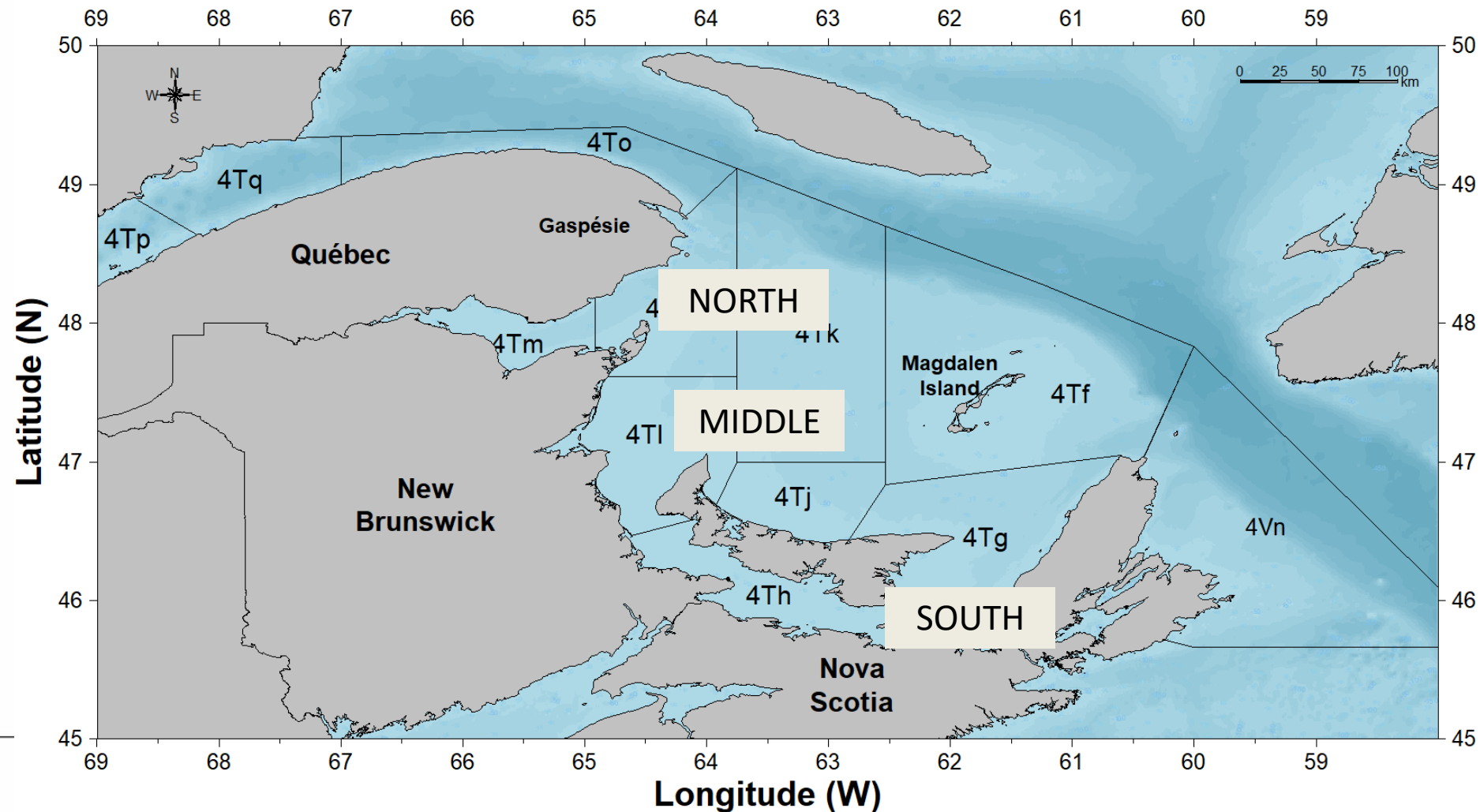
Outline

- Atlantic Herring in 4T
- Acoustics surveys in the Gulf
- DFO annual acoustics survey
- Industry surveys fall
- Industry surveys spring
- Future work





Atlantic Herring in 4T

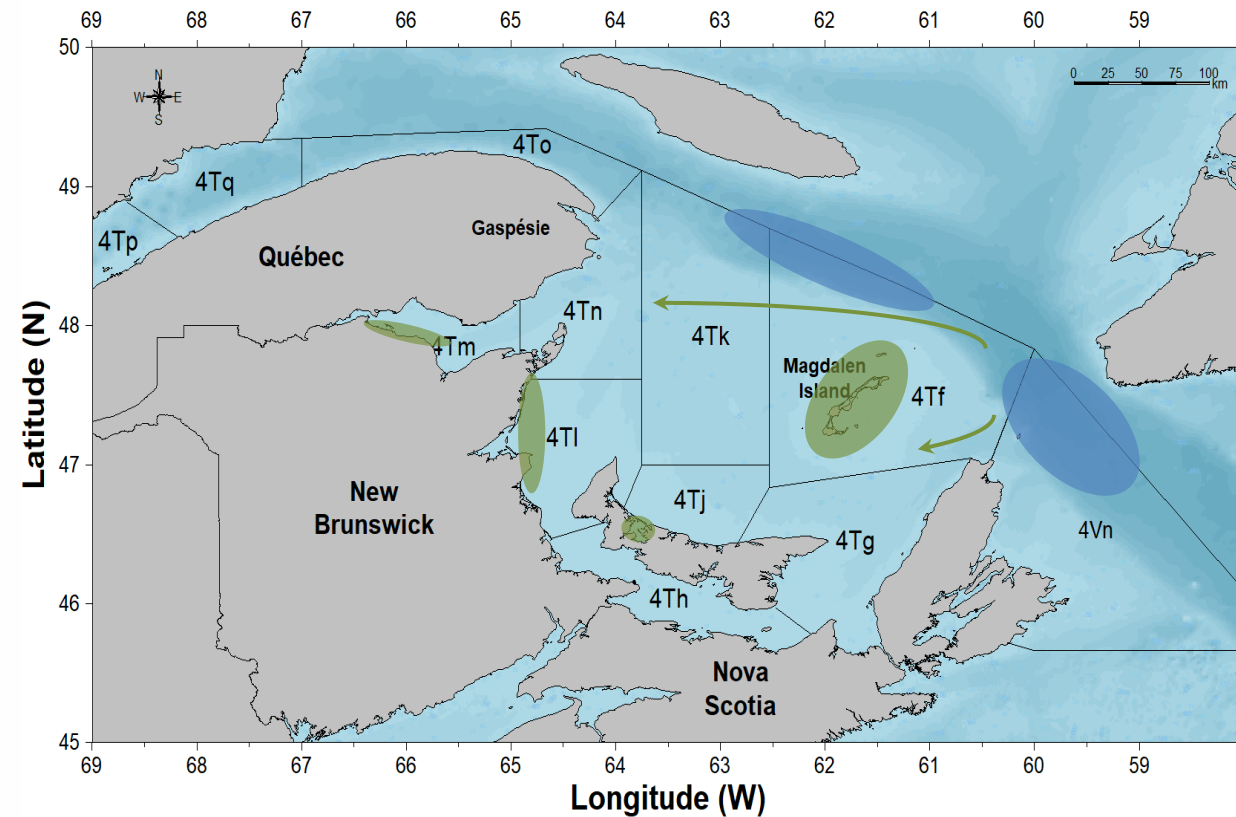




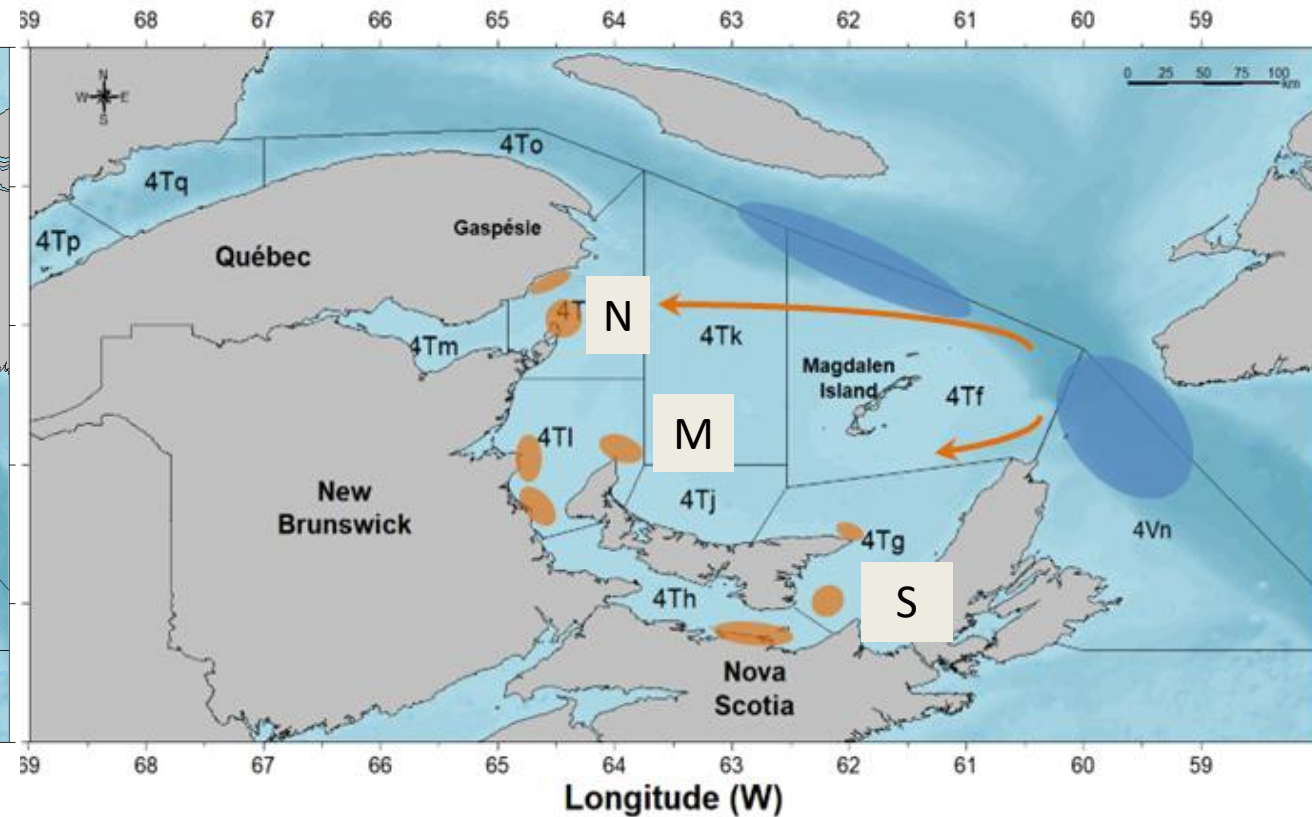
Atlantic Herring in 4T



Spring spawners



Fall spawners



Acoustics surveys in the Gulf Region

- DFO led surveys
 - Annual herring survey
 - September RV survey (data not currently used)
- Industry surveys
 - Fall
 - Spring





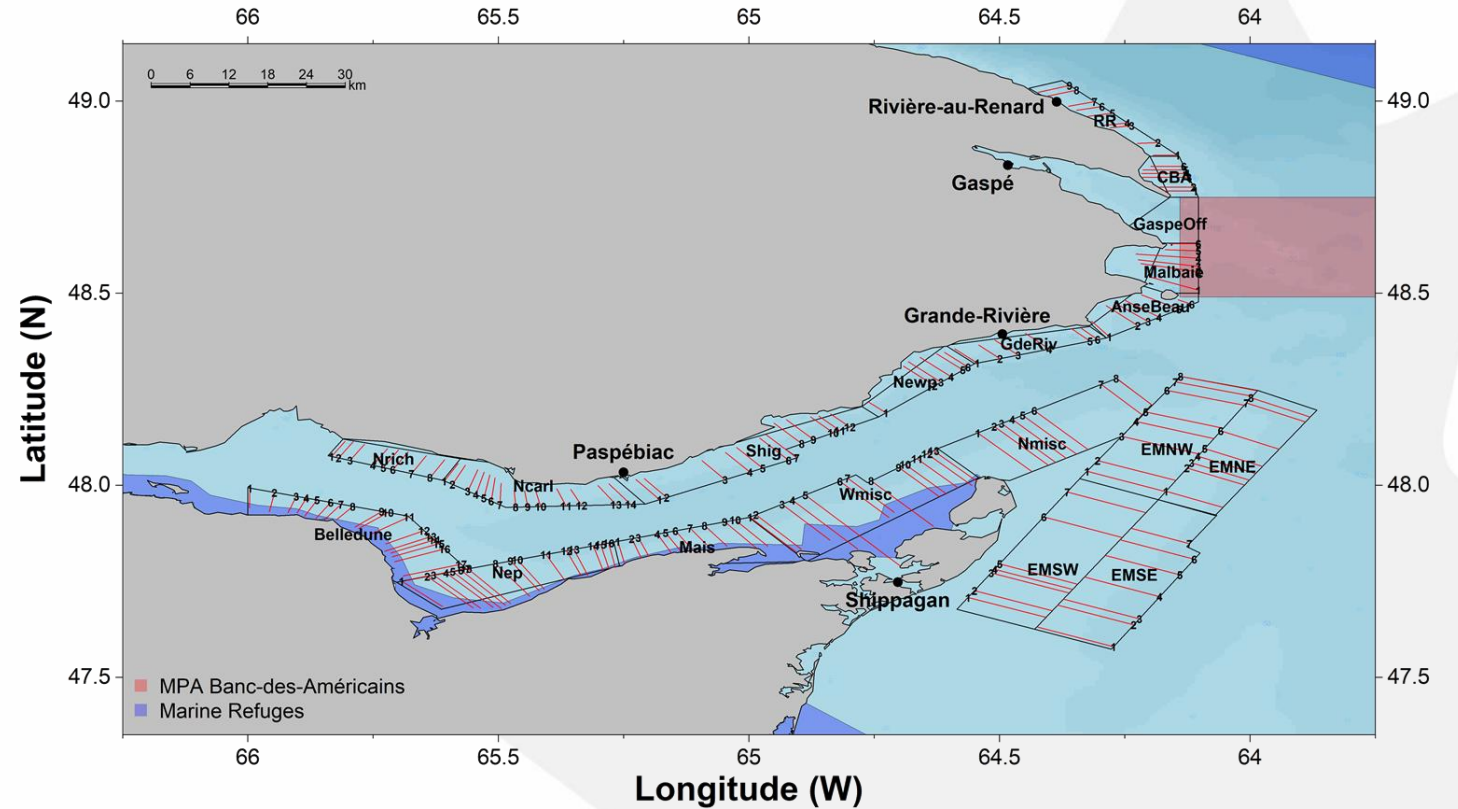
Fishing



Hydroacoustic



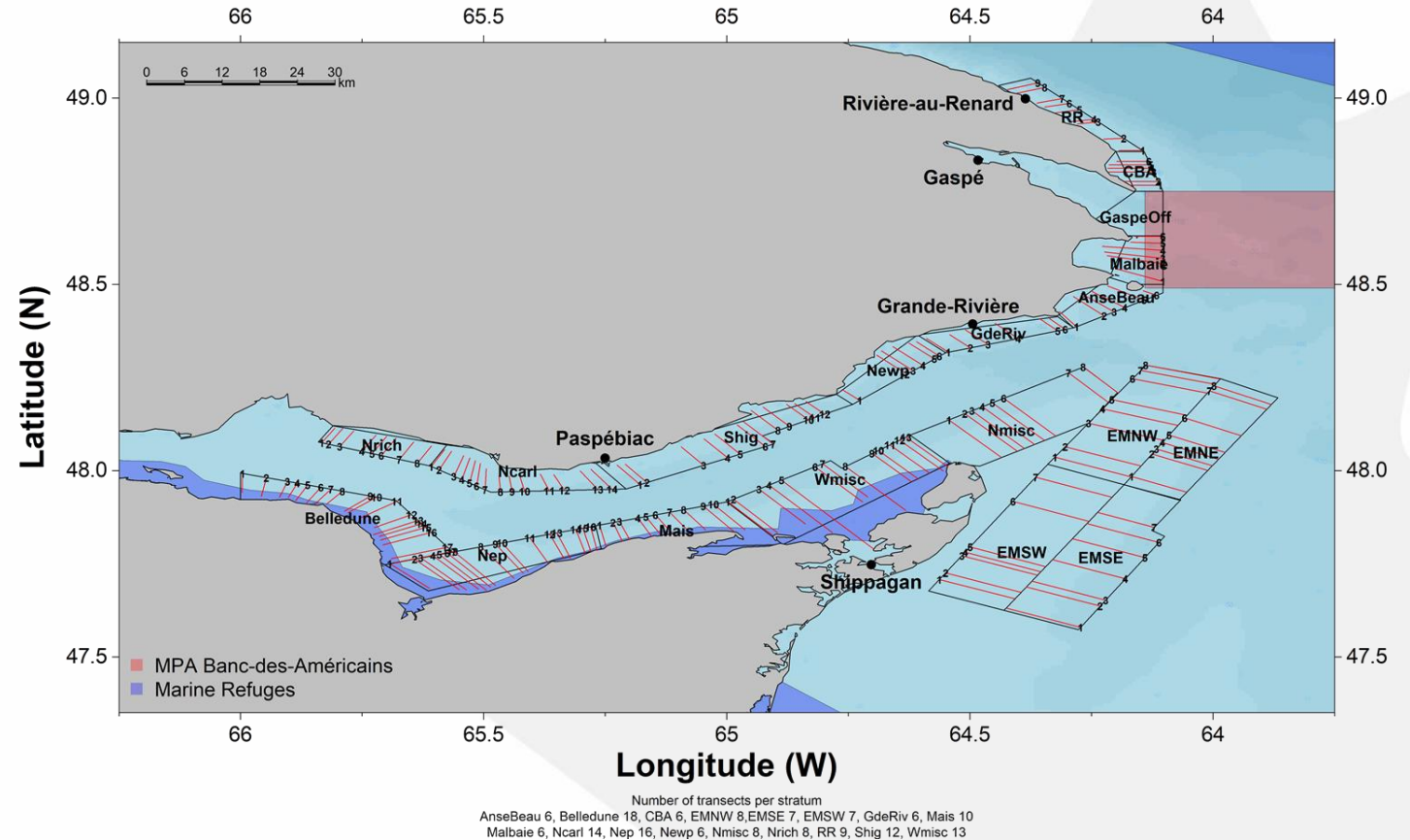
DFO survey



Number of transects per stratum
AnseBeau 6, Belledune 18, CBA 6, EMNW 8, EMSE 7, EMSW 7, GdeRiv 6, Mais 10
Malbaie 6, Ncarl 14, Nep 16, Newp 6, Nmisc 8, Nrich 8, RR 9, Shig 12, Wmisc 13

DFO survey logistics

- Chaleur's Bay and Miscou banks
 - Historical spawning grounds for fall spawners
 - Aggregation of both spring and fall spawners pre-migration
- Strata randomized yearly
 - 18 strata
 - 168 transect
 - Depth = 5m to ~100 m
- Mid-september to mid-october
 - Fall spawning
 - Pre-migration
- Yearly since 1994



DFO survey equipment

- SIMRAD EK80
 - 200 kHz
 - **120 kHz**
 - 38 kHz



DFO survey challenges



Large area to cover

Weather
Long transit



Can't cover the entire Gulf



Minimum Two DFO trained staff



Timing of fishery

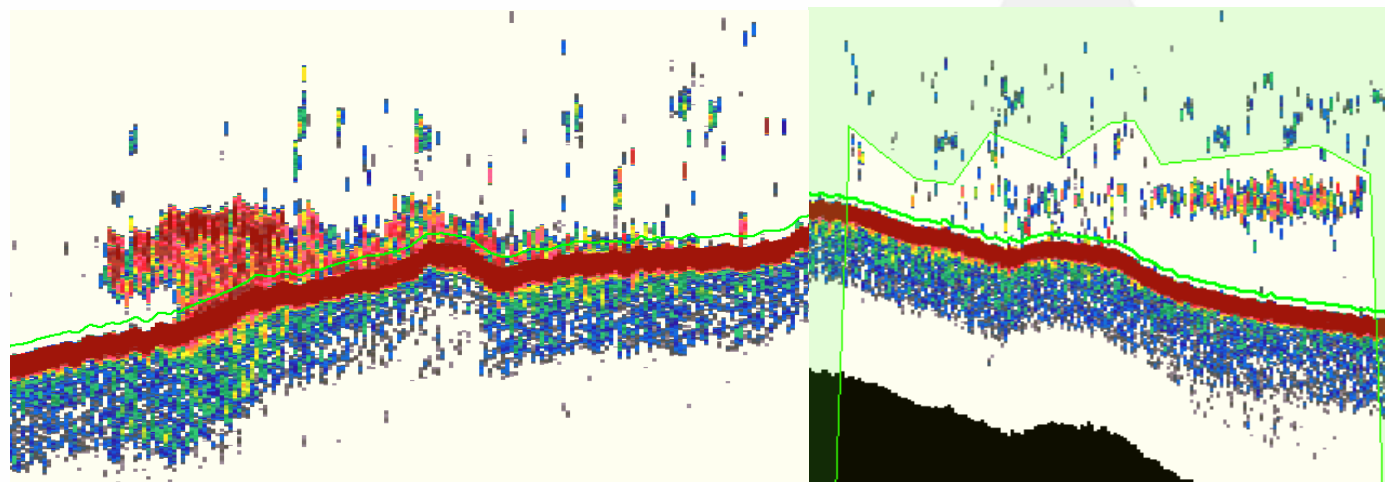


Vessel downtime



Find fish

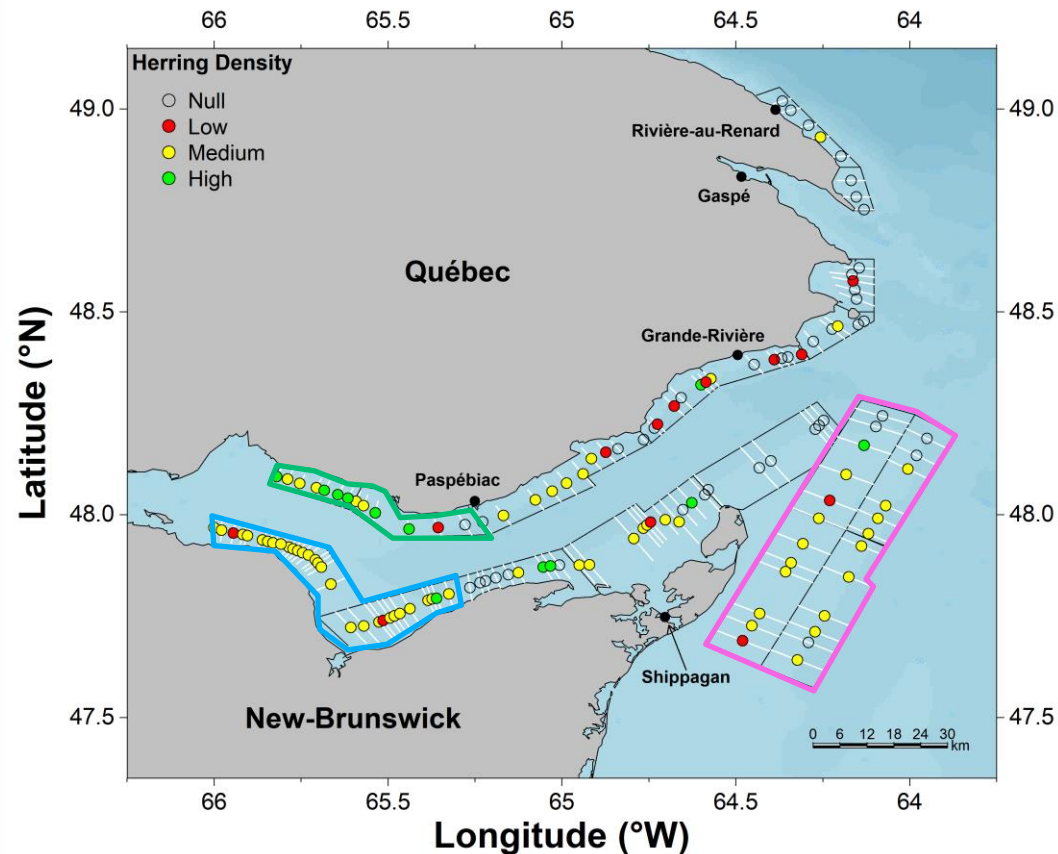
Gear change
Small school



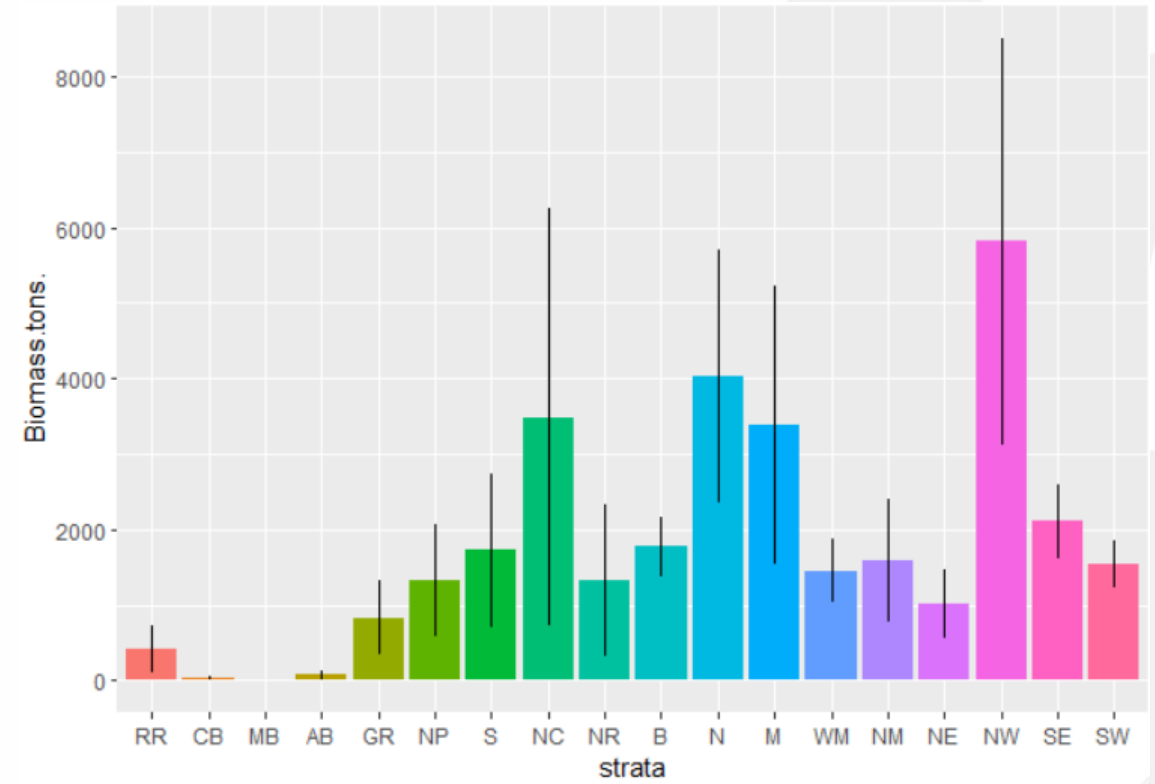
	Percent coverage
2020	66%
2021	83%
2022	87.5%
2023	94%

DFO survey

- Biomass throughout the region

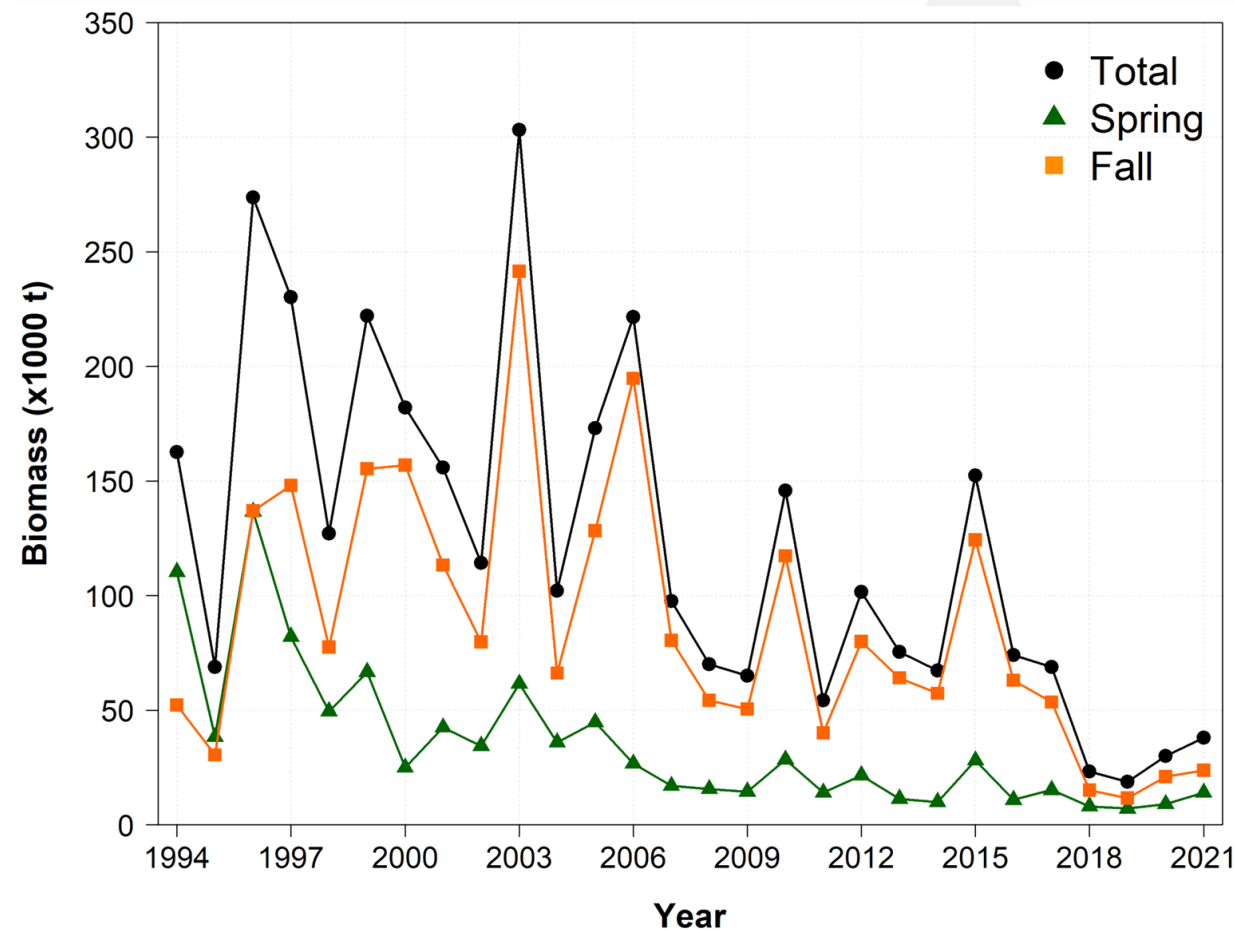
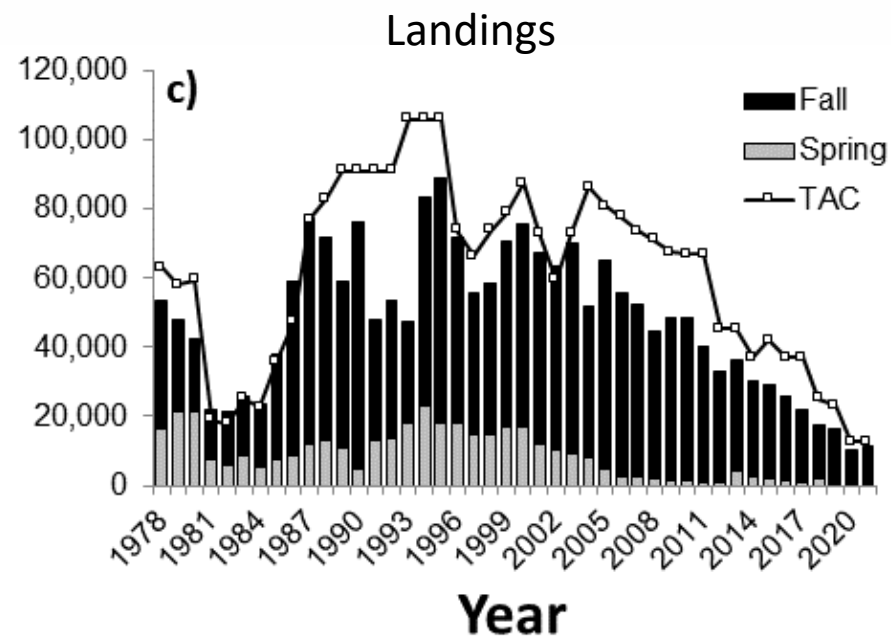


2020-2022



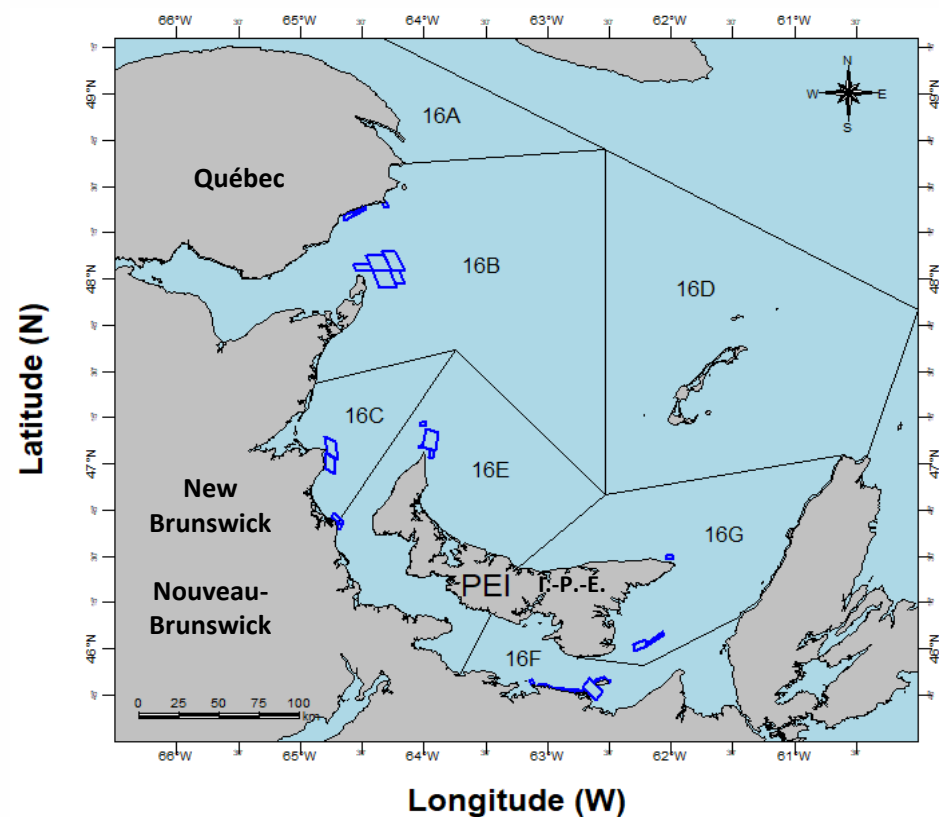
DFO survey

- Biomass by year

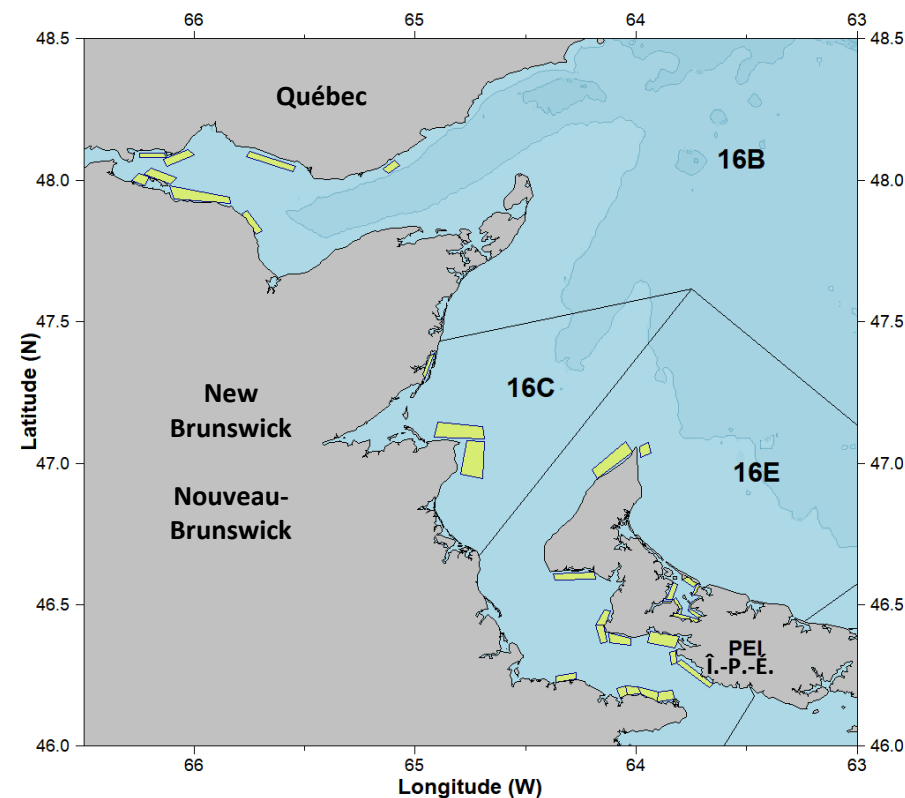


Industry acoustic surveys

Fall spawning grounds

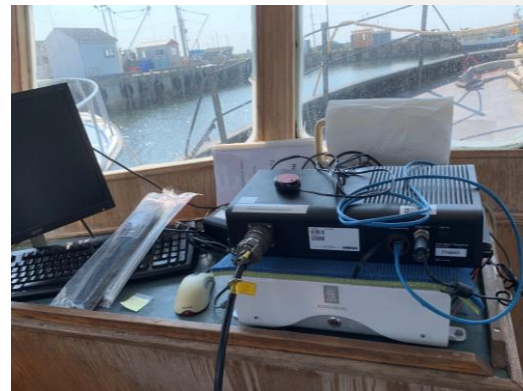


Spring spawning grounds



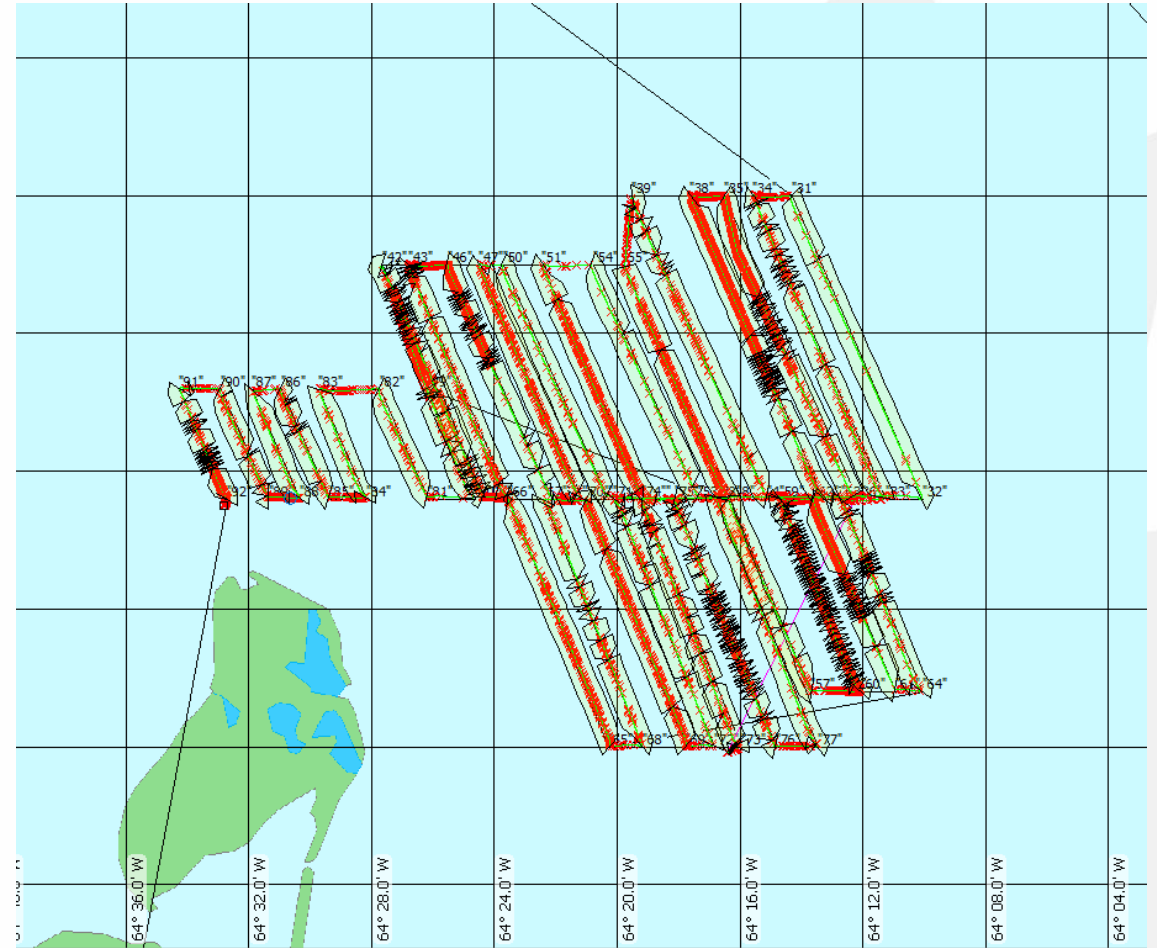
Industry survey equipment

- Small fishing vessels
- Simrad ES80 transceiver, ES120-7C transducer
 - FEMTO used in some areas until 2020
- Side mounted units
- Work occurs at the same time as the fishery



Industry survey logistics

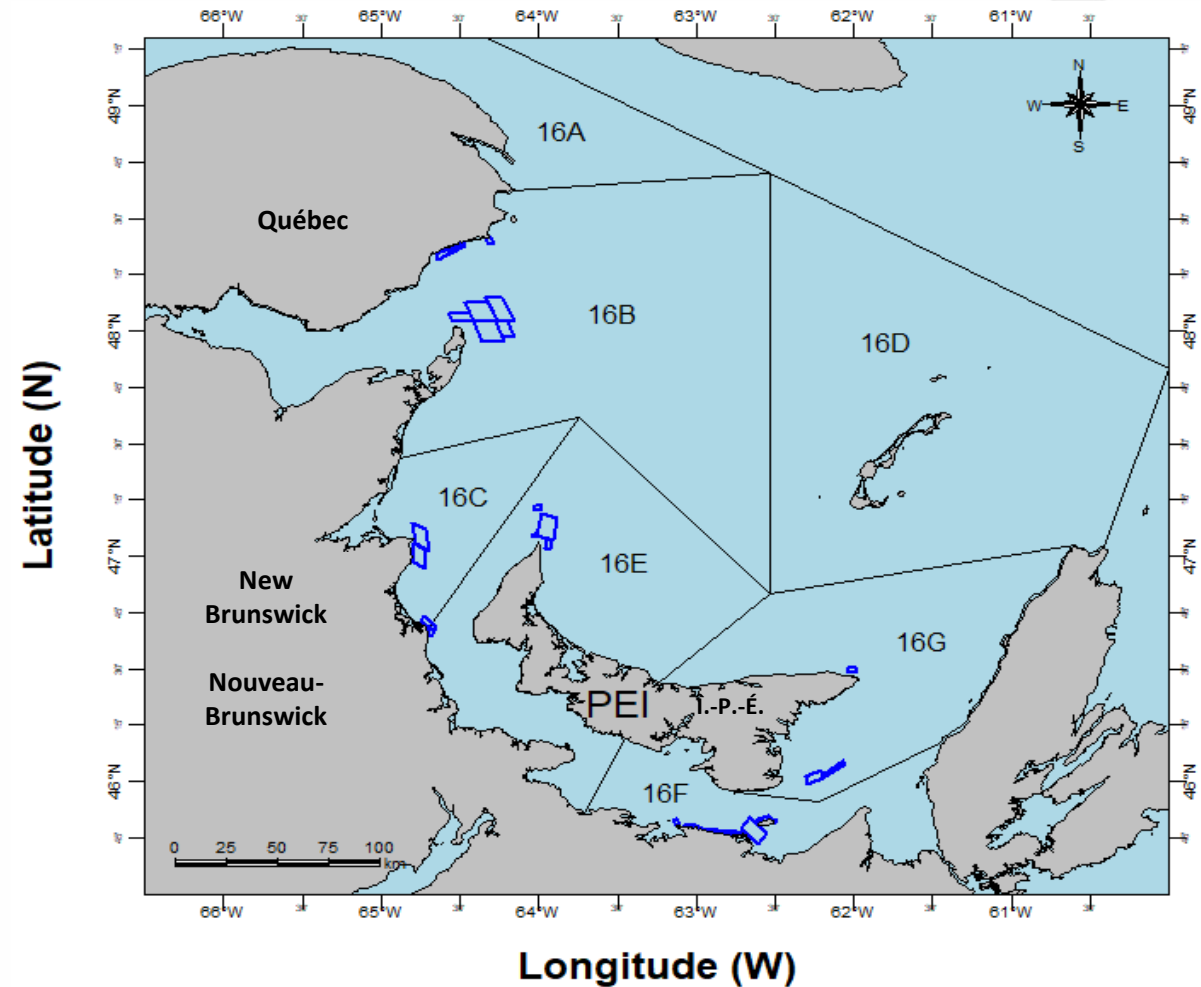
- Contracts with fishing associations or organizations
 - Contract types: sole source, competitive
 - Multi-year contracts when possible
 - Pay per strata based on bids received
- Developed relationships with fishers and associations
- Calibrate all equipment at one time
- Install equipment on vessels prior to start of fishing season
- Regular communication with fishers throughout survey
- Check data and make necessary changes



Fall acoustics surveys

Fall spawning grounds

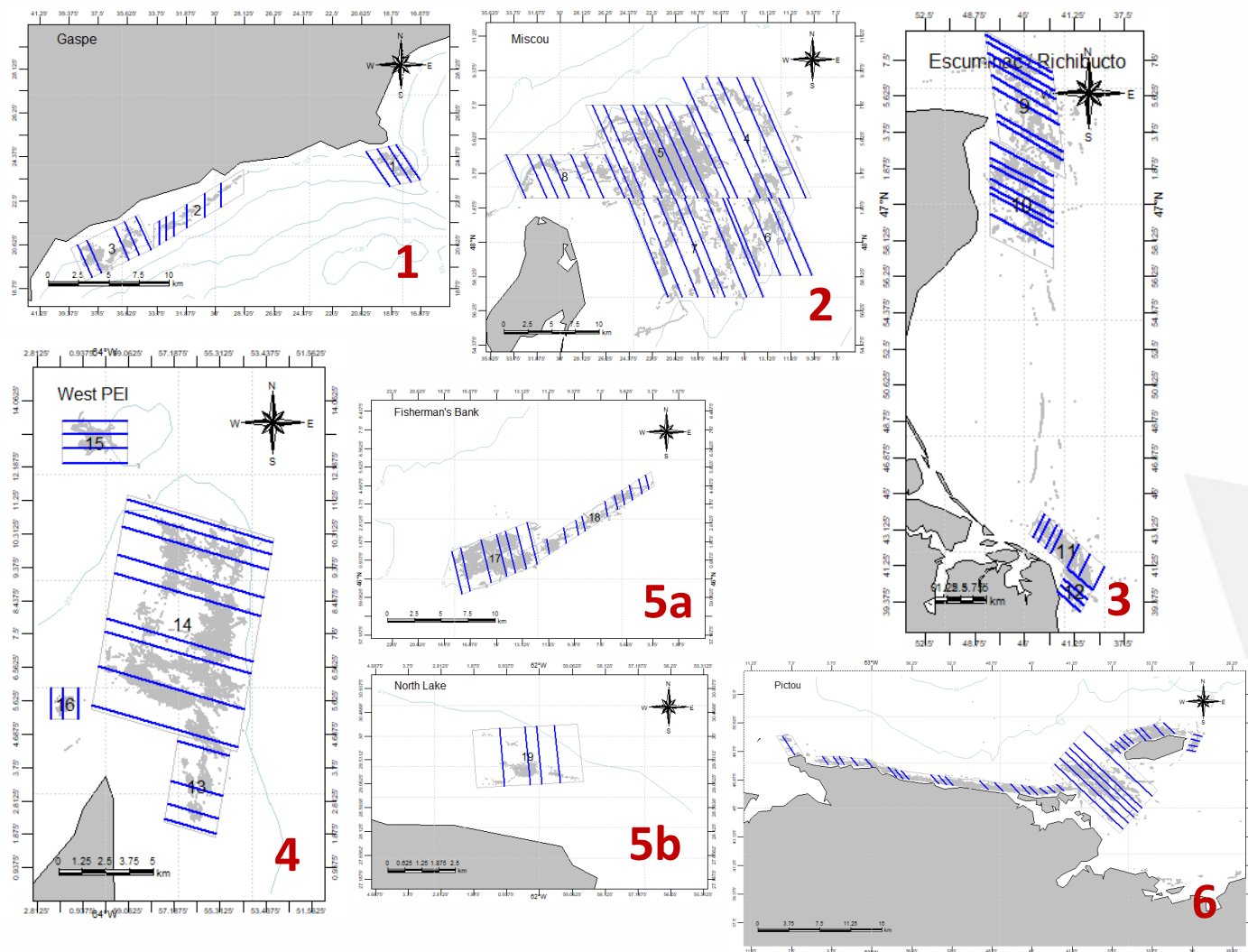
- Region 1: 16B – Gaspé
- Region 2: 16B – Miscou
- Region 3: 16C – Escuminac
- Region 4: 16E – West PEI
- Region 5: 16G – East PEI
- Region 6: 16F – Pictou



Fall survey design

Goal: 5 surveys in each region

- Once each weekend closure
 - Once before and after fishing season
- Strata chosen based on historical fishing vessel data
- Random transects selected within standard survey strata
- Paired with experimental multi-mesh benthic gillnet sets that are set during the fishery during the week
- 2015-present



Fall survey challenges



Contracting



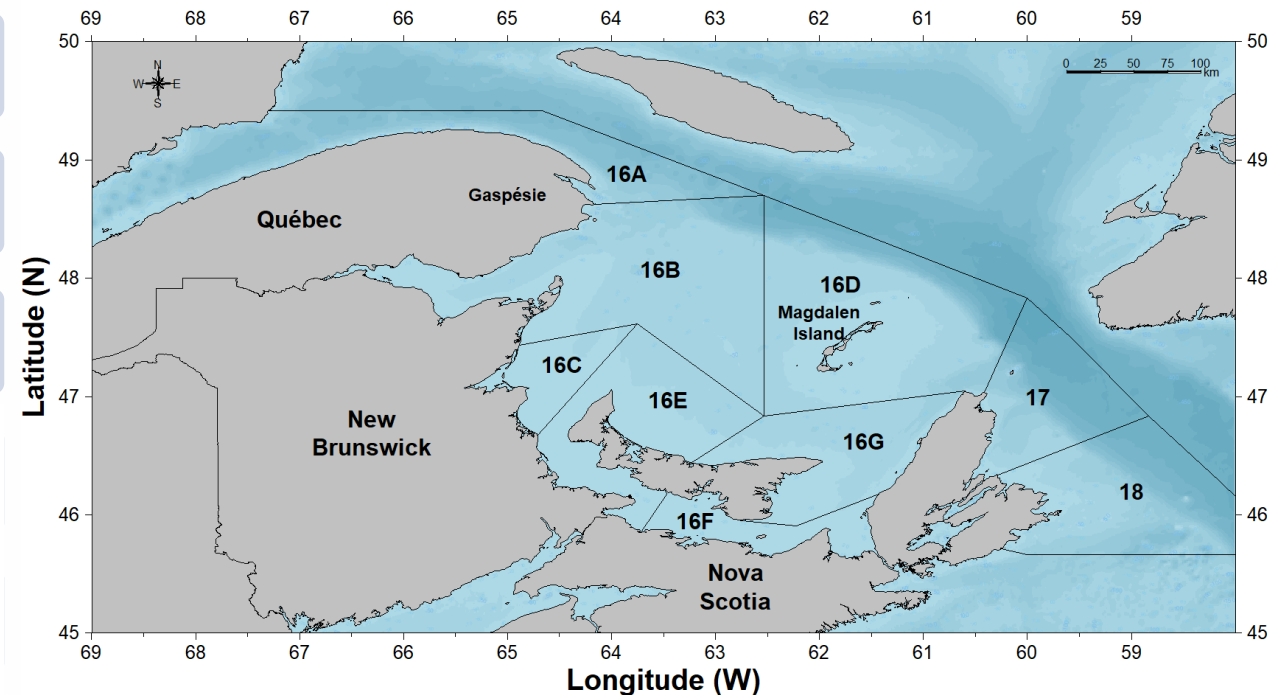
Cost



Many fishers conducting acoustics at same time (6 fishers)



Technical equipment



Fall survey challenges



Contracting



Cost



Many fishers conducting acoustics at same time (6 fishers)



Technical equipment



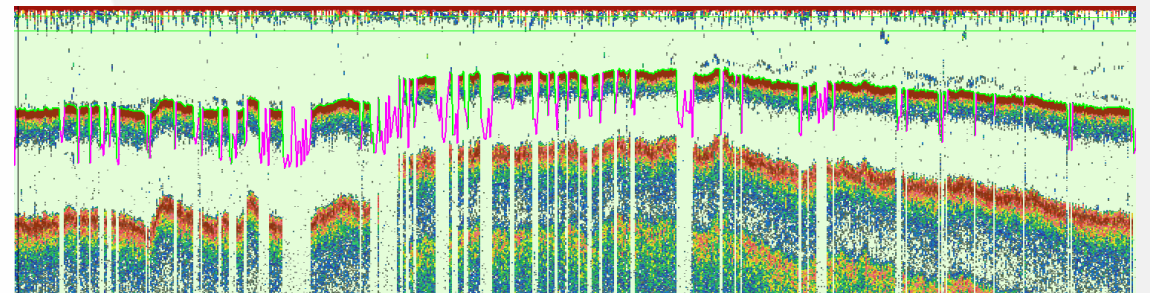
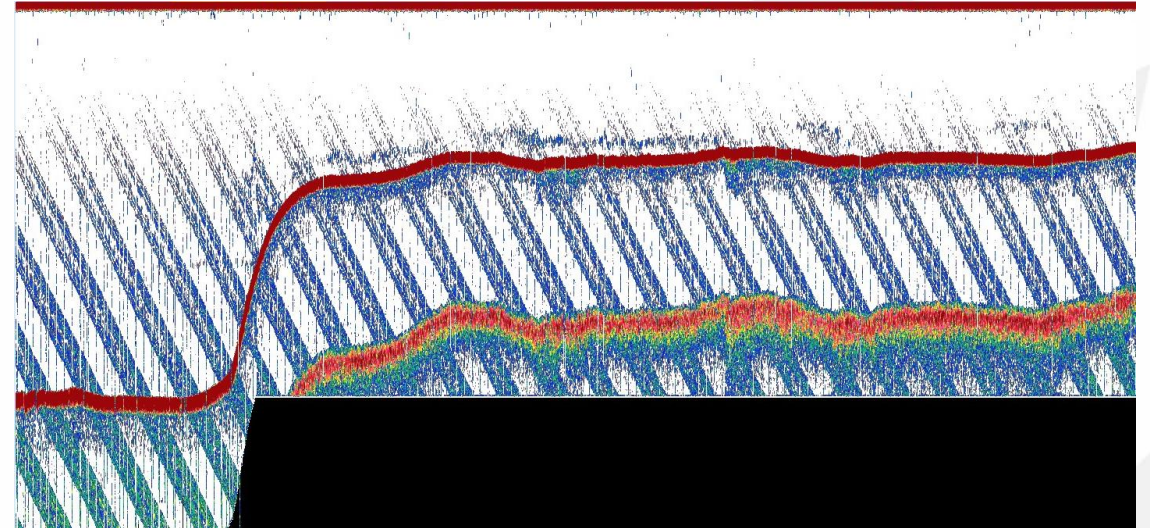
Equipment problems



Troubleshooting on the phone occurs on weekends, in the evening



Missing surveys



Fall survey challenges

Causes of missing surveys:

- Missing weekend closures
- Weather – window of only 2 nights a week to conduct surveys
- Lack of participants in some areas
- Length of fishing season

Number of individual acoustic sampling trips per year and region from fall acoustic surveys.

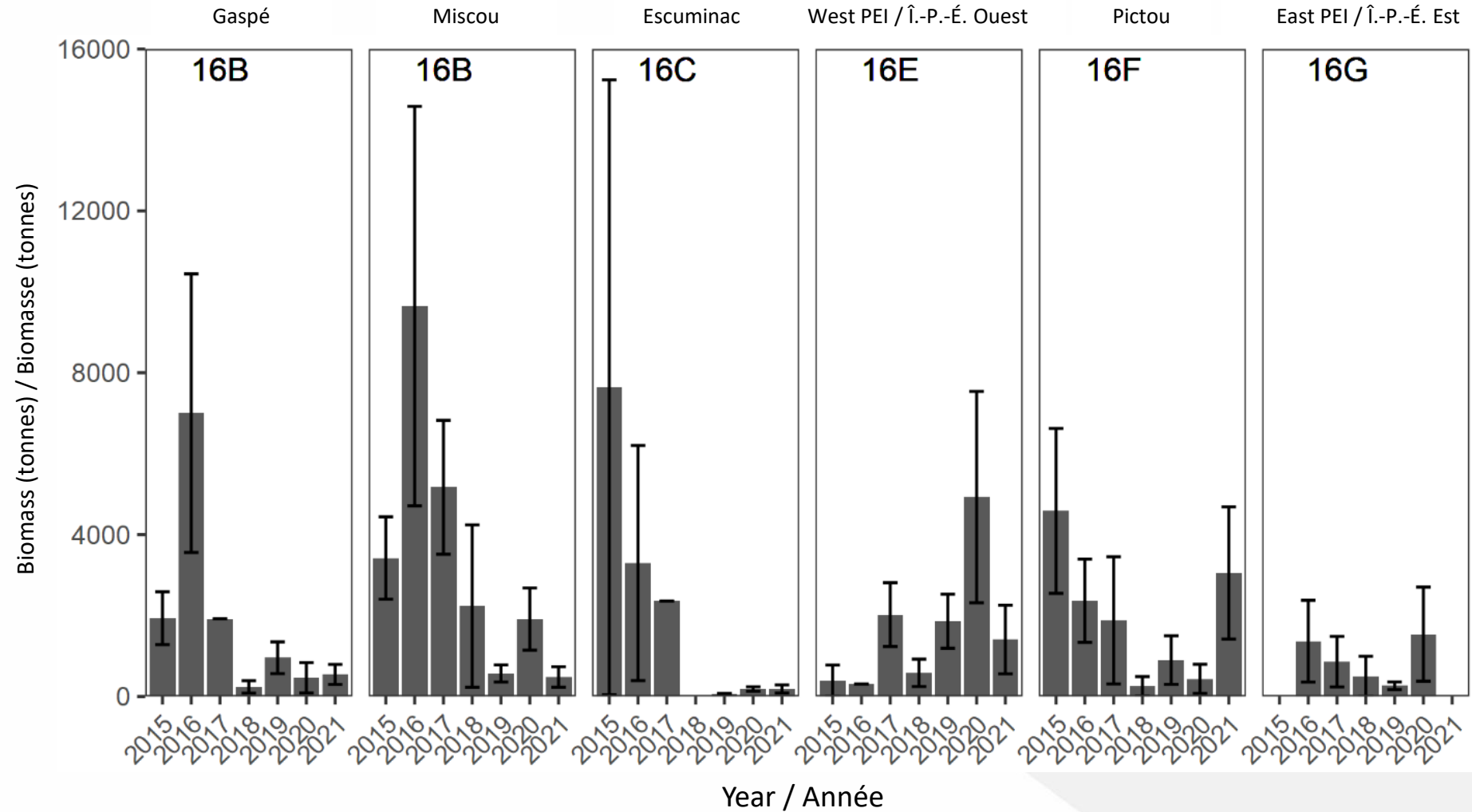
Region	2015	2016	2017	2018	2019	2020	2021	2022	2023
Gaspe	5	5	1	5	7	5	5	4	5
Miscou	5	5	4	5	7	6	4	4	11+
Escuminac	2	2	1	0	1	6	3	5	4
West PEI	2	1	2	6	4	7	4	5	5
Pictou	5	5	4	5	5	5	5	5	5
East PEI	0	3	5	2	2*	3*	0	5*	5*
Total	19	21	17	23	26	32	21	28	35

*only Fisherman's Bank, not North Lake

Predictive model meant to overcome these data gaps



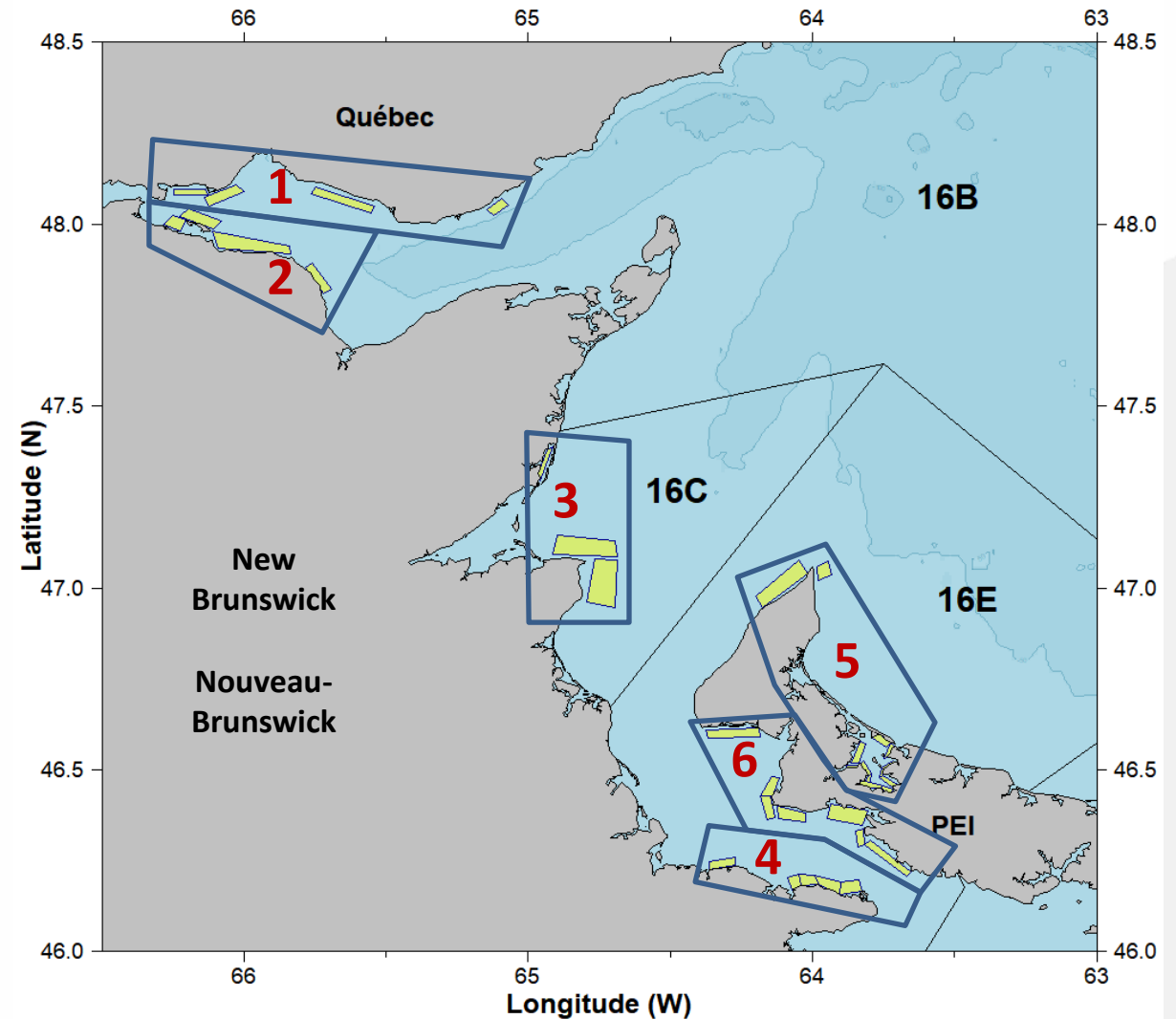
Mean nightly biomass estimates (± 1 SE) by spawning ground

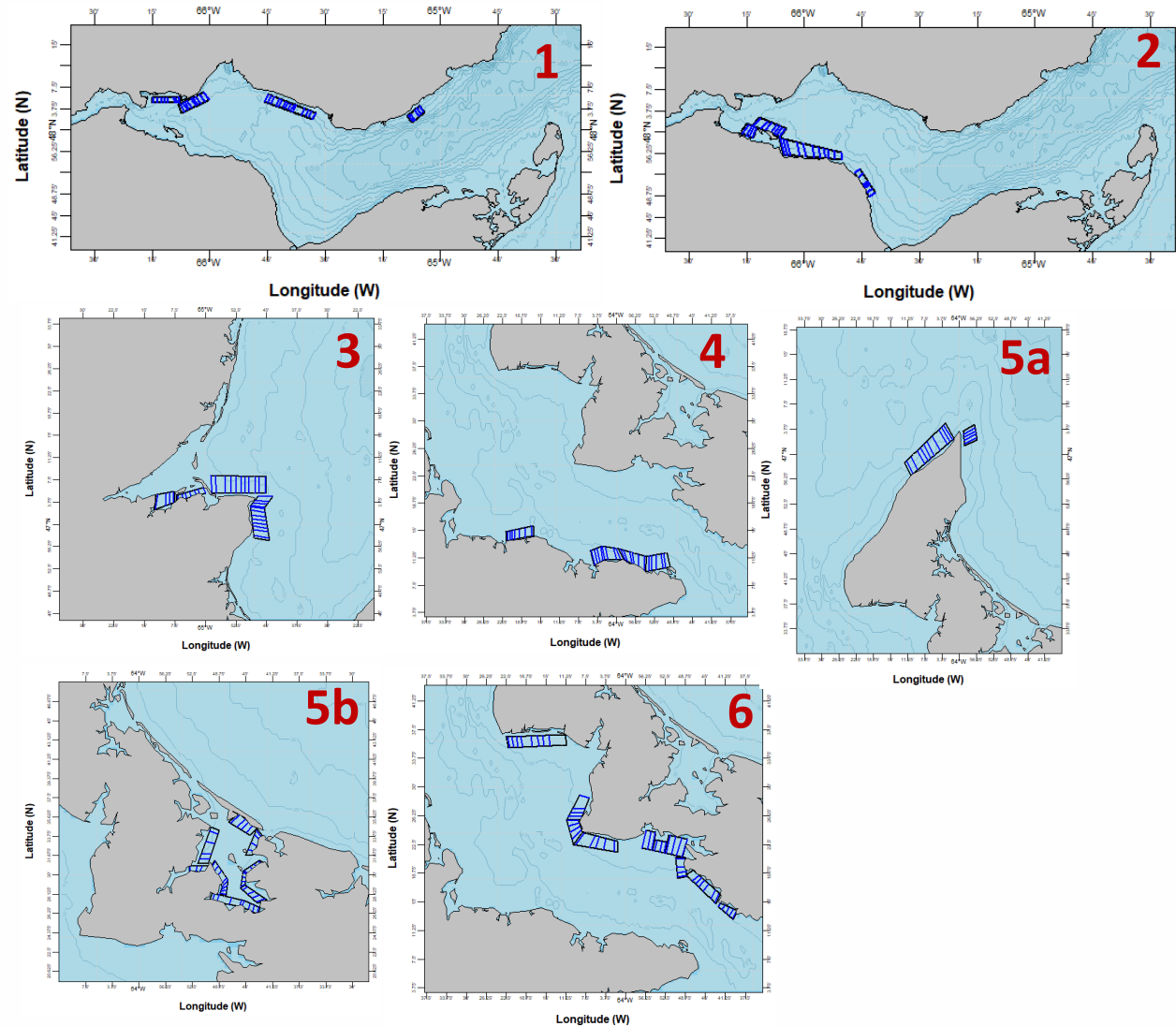


Spring acoustics surveys

Suggested Regions by Industry

- Region 1: 16B – Chaleur Bay, North side
- Region 2: 16B – Chaleur Bay, South side
- Region 3: 16C – Escuminac
- Region 4: 16E – Cap-Pelé, Cape Jourimain
- Region 5: 16E – PEI, North side
- Region 6: 16E – PEI, South side

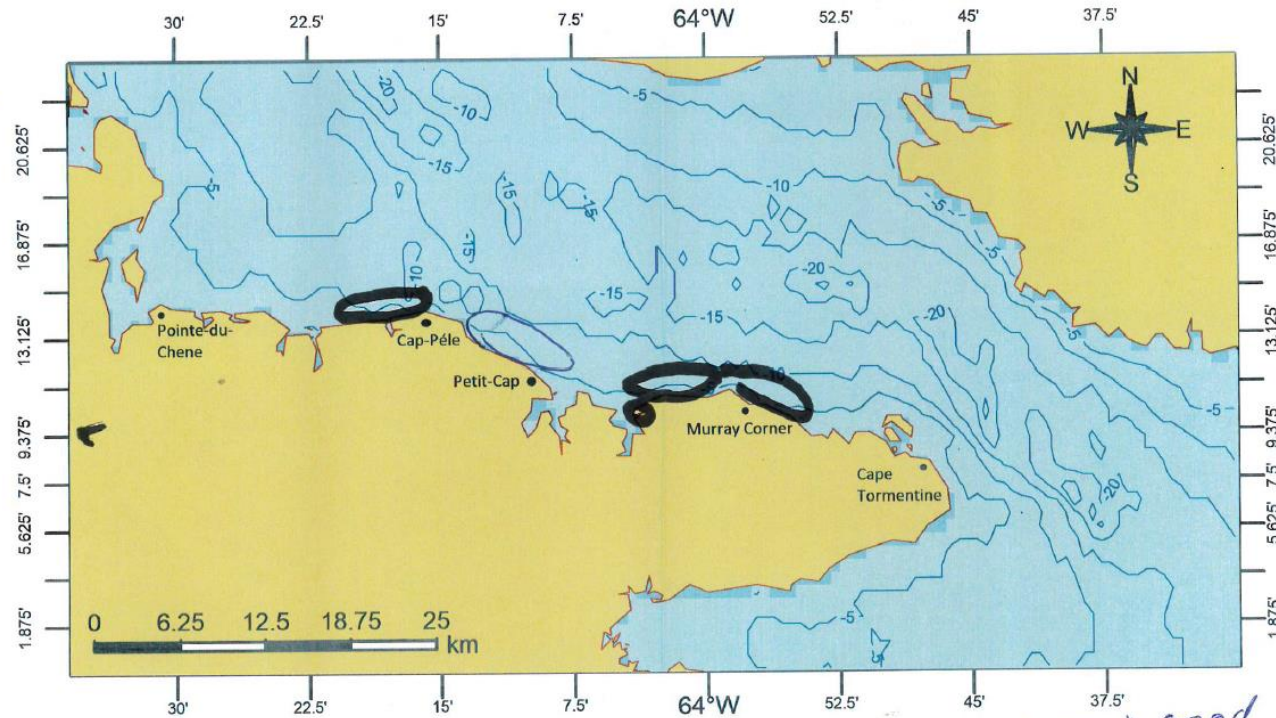




Spring survey design

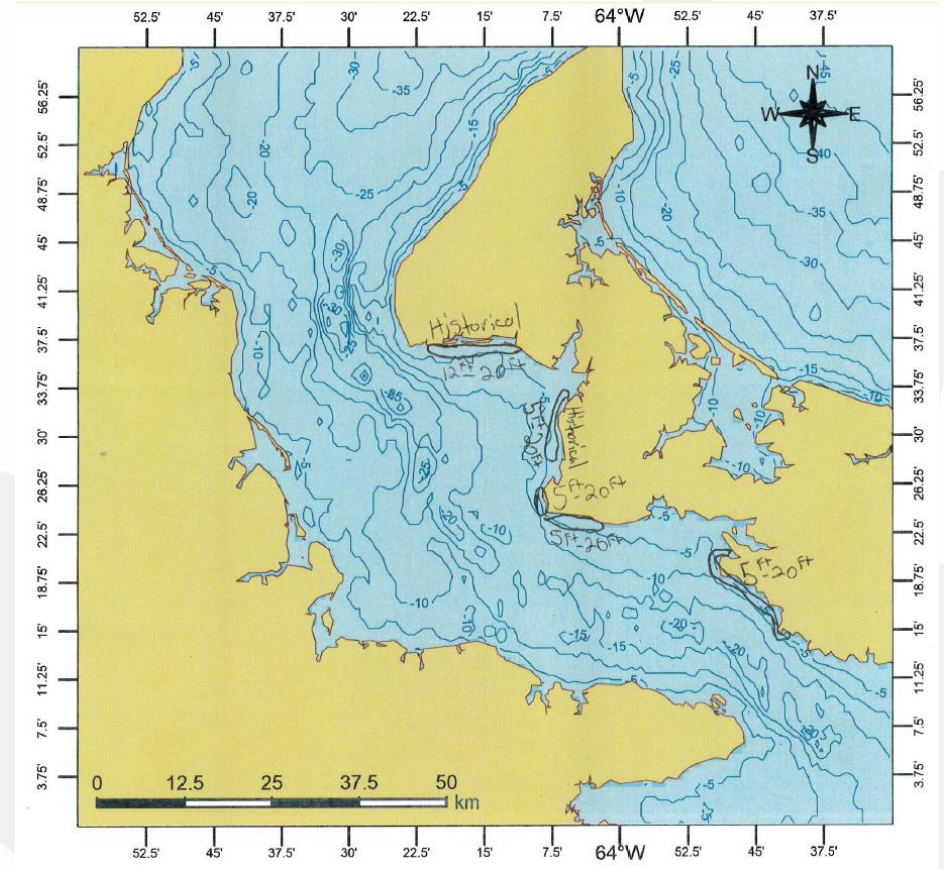
Goal: 5 surveys in each region

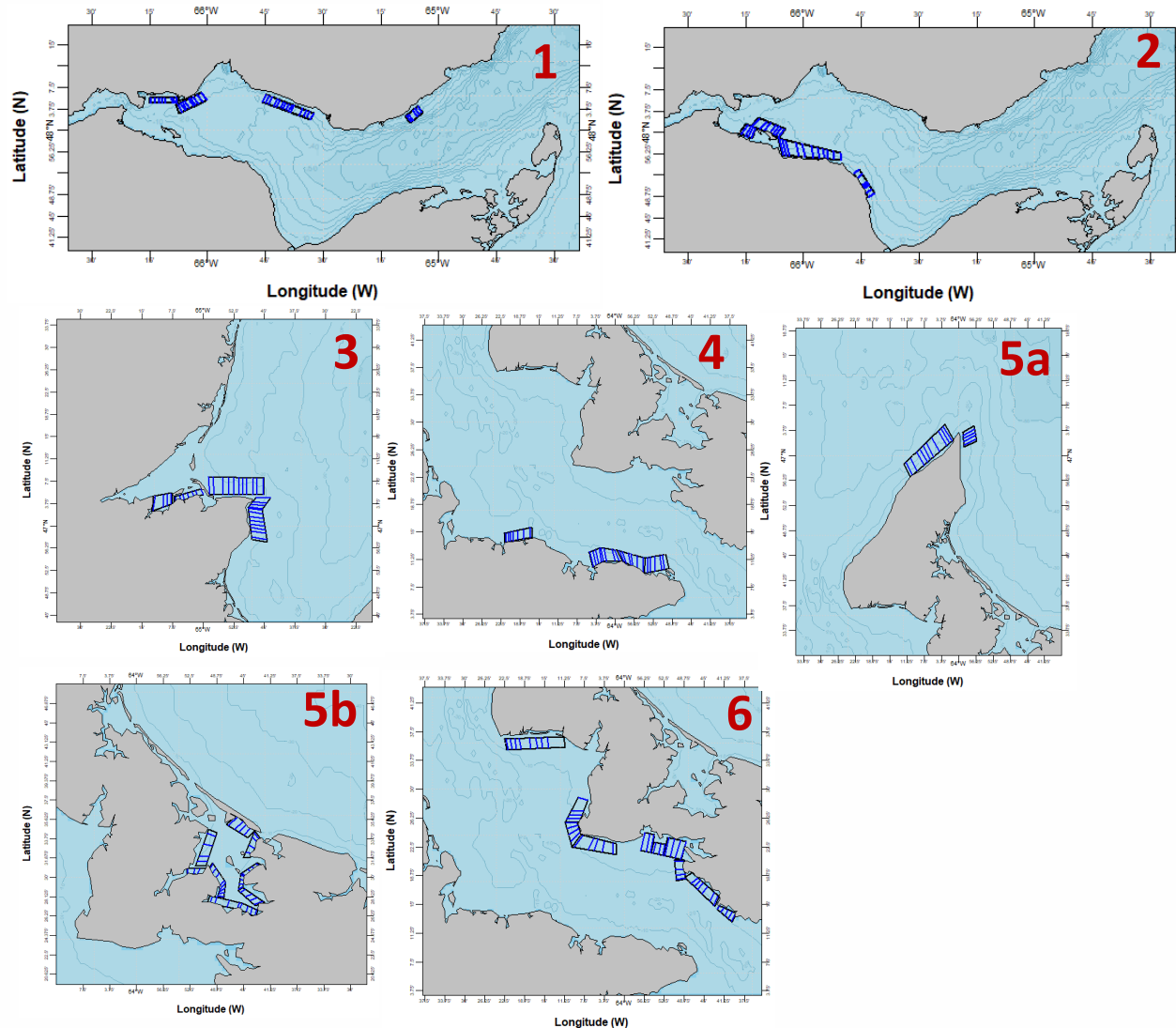
- Once each weekend closure
Once before and after
fishing season
- Strata chosen based on
questionnaires



BLACK MARKET
good SPAWING ground

was very good
spawning
ground
Blue Pin
never SPAWN in 5 YEARS





Spring survey design

Goal: 5 surveys in each region

- Once each weekend closure
Once before and after
fishing season
- Strata chosen based on
questionnaires
- Random transects selected
within standard survey strata
- Paired with experimental
multi-mesh benthic gillnet
sets that are set during the
week
- 2021-2023

Spring survey challenges

Contracting

Cost

Technical equipment

Many fishers conducting acoustics at same time (7 fishers)

Troubleshooting on the phone occurs on weekends, in the evening

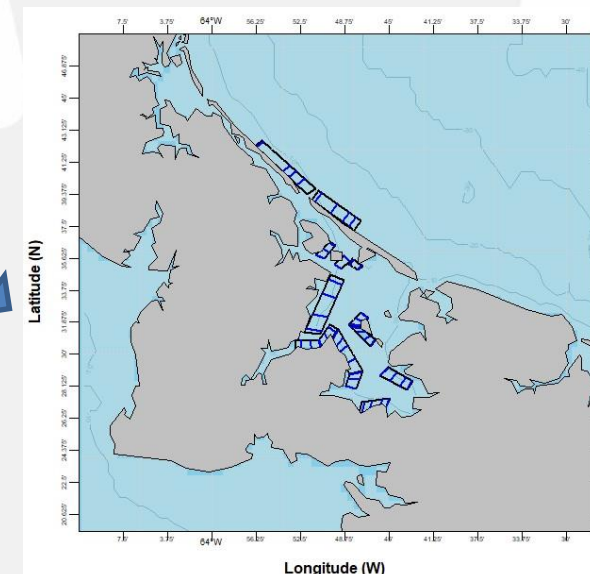
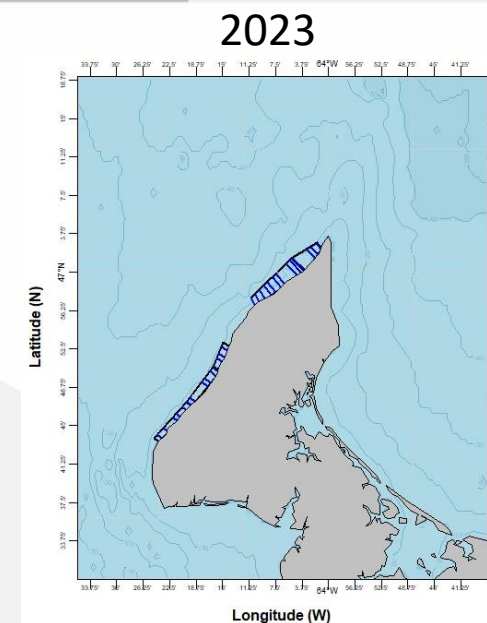
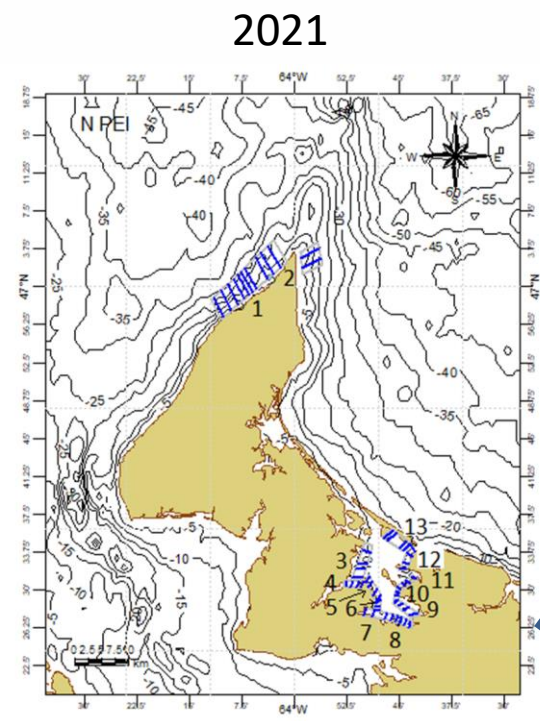
Equipment problems

Missing surveys – ice conditions

Other fisheries

Difficulty getting fish samples

Difficulty establishing strata to survey



Spring survey challenges



Contracting



Cost



Technical equipment



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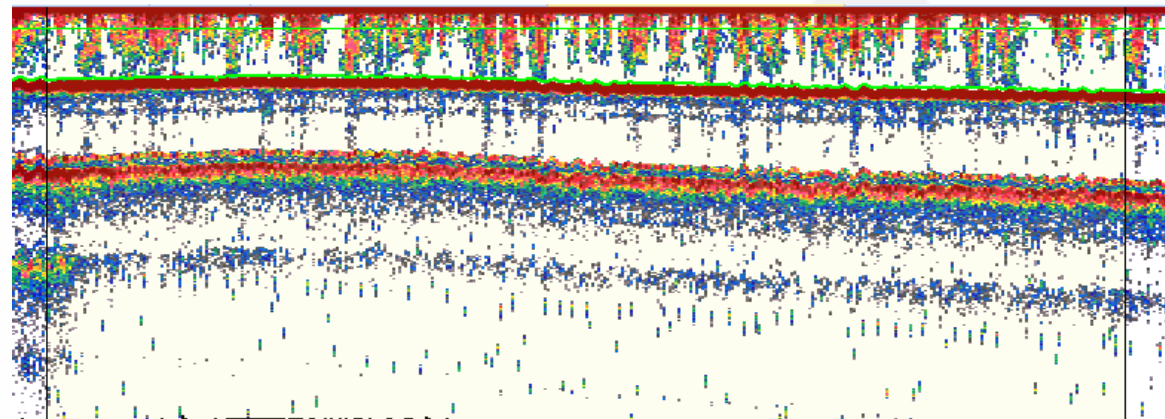


Difficulty establishing strata to survey

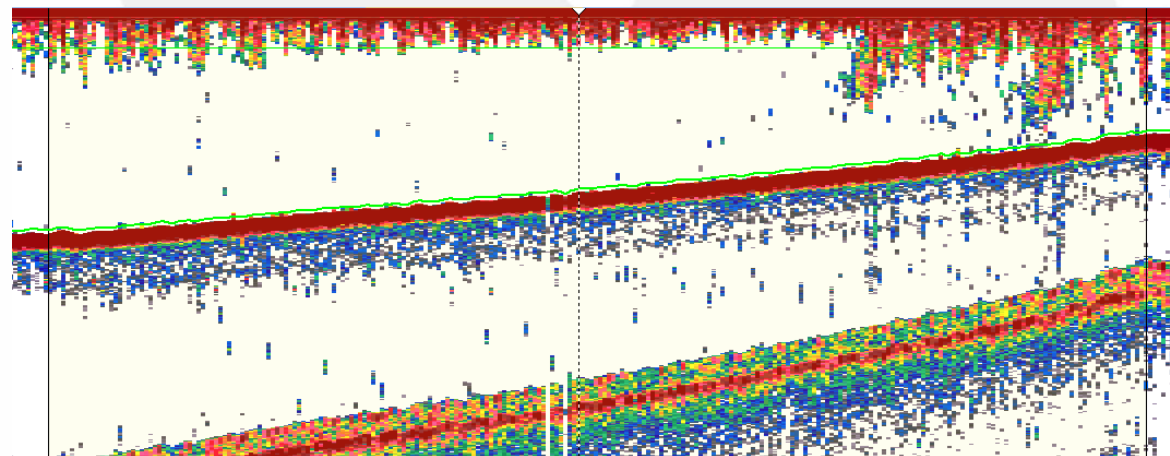


Shallow water

3 m depth



5 m depth



Future work

- Separate fuel costs out of contracts
- Future of spring surveys
- Industry request to expand fall surveys
- Timing of these surveys given changes in climate, fish presence, etc.

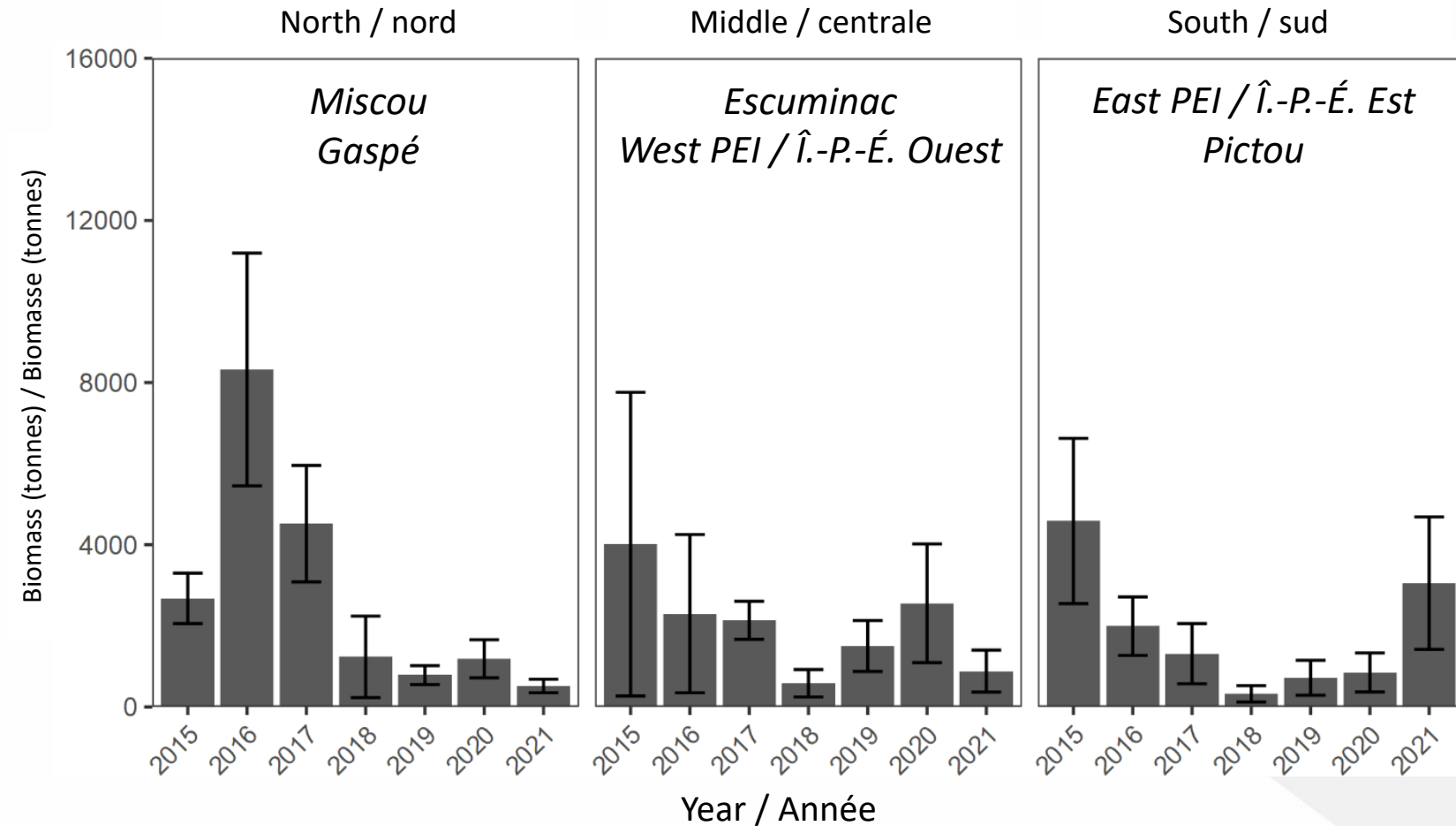
Acknowledgements

- Prince Edward Island Fisherman's Association
- Homarus
- Gulf Nova Scotia Herring Federation
- l'Association de gestion halieutique autochtone Mi'gmaq et Wolastoqey (AGHAMW)
- Le Regroupement des Pêcheurs Professionnels du Sud de la Gaspésie Inc.
- Cheticamp Monitoring
- Many individual fishers and samplers
- Many DFO staff



Questions?

Mean nightly biomass estimates (± 1 SE) by region



Biomasse moyenne estimée par nuit (± 1 ES) par région

- Decreasing biomass
- Diminution de la biomasse
- Biomass is more similar over time
- La biomasse est plus similaire fil du temps