An Assessment of Sea Scallop Abundance and Distribution in the Mid-Atlantic Bight and Georges Bank Resource Areas

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Preliminary – PDT use only

2025 VIMS-Industry Cooperative Surveys

- Sampling design
  - Stratified random design
    - NMFS shellfish strata
    - SAMS Areas included in survey domains
  - Station Allocation
    - Hybrid approach – stratum area & prior year catch data (biomass & number)
- Tow a survey dredge & commercial dredge simultaneously
  - Survey dredge – 8 ft in width, 2 in rings & 1.5 in diamond mesh liner
  - Commercial dredge – varies by vessel and area
  - Survey dredge performance monitored

Biomass Estimation

- **Biomass calculated using swept area method (Cochran, 1997)**
- **Area swept per tow (a_s)**
  - **Navigational info**
  - **Tilt sensor**
- **Catch weight per tow (C_h)**
  - **Expanded length frequencies ≥ 40 mm**
  - **SHMW relationships from 2025 research track assessment or determined by PDT**
  - **Selectivity (Roman and Rudders, 2019)**
- **Efficiency (E_s)**
  - **Values from Miller et al. (2018) for survey dredge:**
    - **.40 in soft bottom**
  - **Commercial Dredge = .65**

Stratified mean biomass per tow in stratum and SAMS Area

$$\bar{C}_{h,s} = \frac{1}{n_h}\sum_{i=1}^{h} C_{i,h,s}$$

$$Var(\bar{C}_{h,s}) = \frac{1}{n_h(n_h-1)}\sum_{i=1}^{n_h}(C_{i,h,s} - \bar{C}_{h,s})^2$$

Stratified mean biomass per tow in SAMS Area

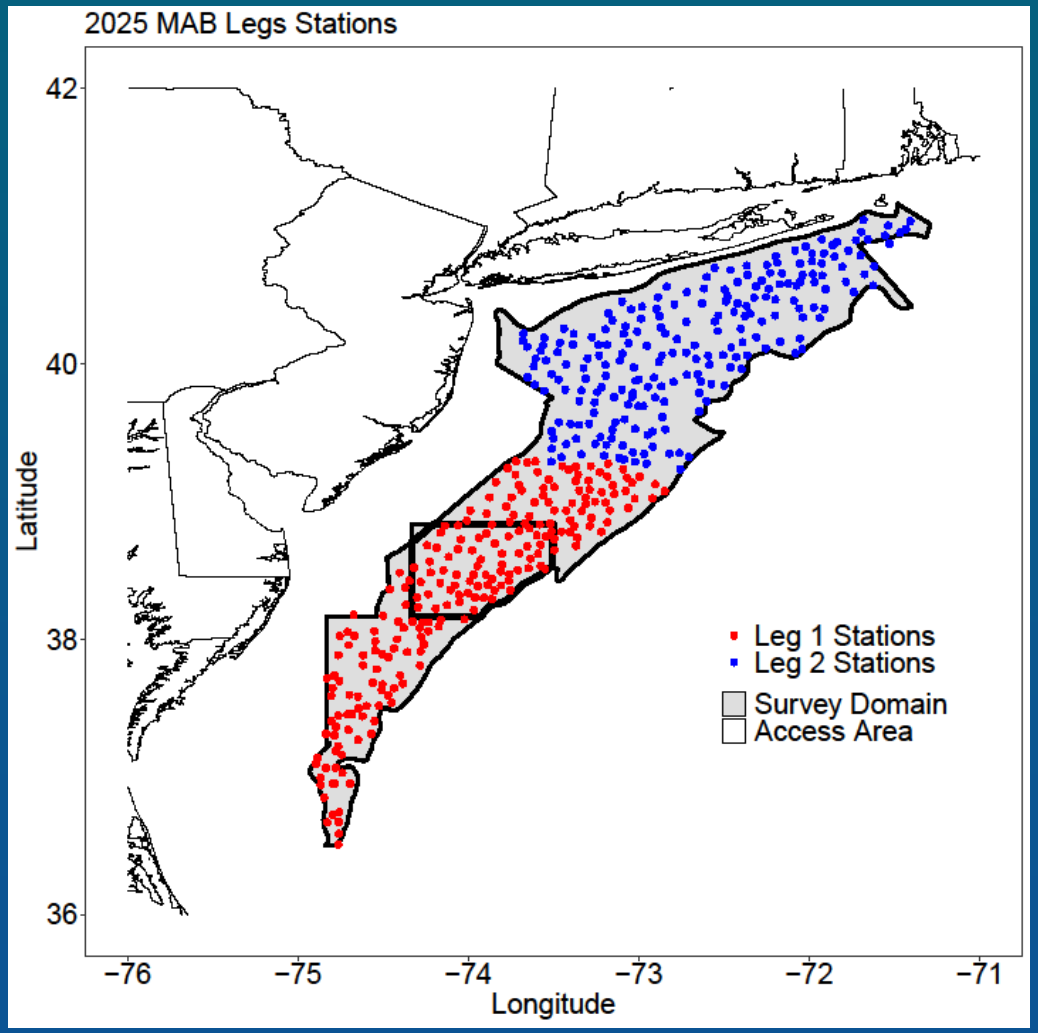
$$\bar{C}_s = \sum_{h=1}^{L} W_h \cdot \bar{C}_{h,s}$$

$$Var(\bar{C}_s) = \sum_{h=1}^{L} W_h^2 \cdot Var(\bar{C}_h)$$

Total biomass in SAMS Area

$$\widehat{B_s} = \left(\frac{\left(\frac{\bar{C}_s}{\bar{a}_s}\right)}{E_s}\right) A_s \qquad Var(\widehat{B_s}) = Var(\bar{C}_s) \cdot \left(\frac{A_s}{\bar{a}_s}\right)^2$$

2025 MAB Legs

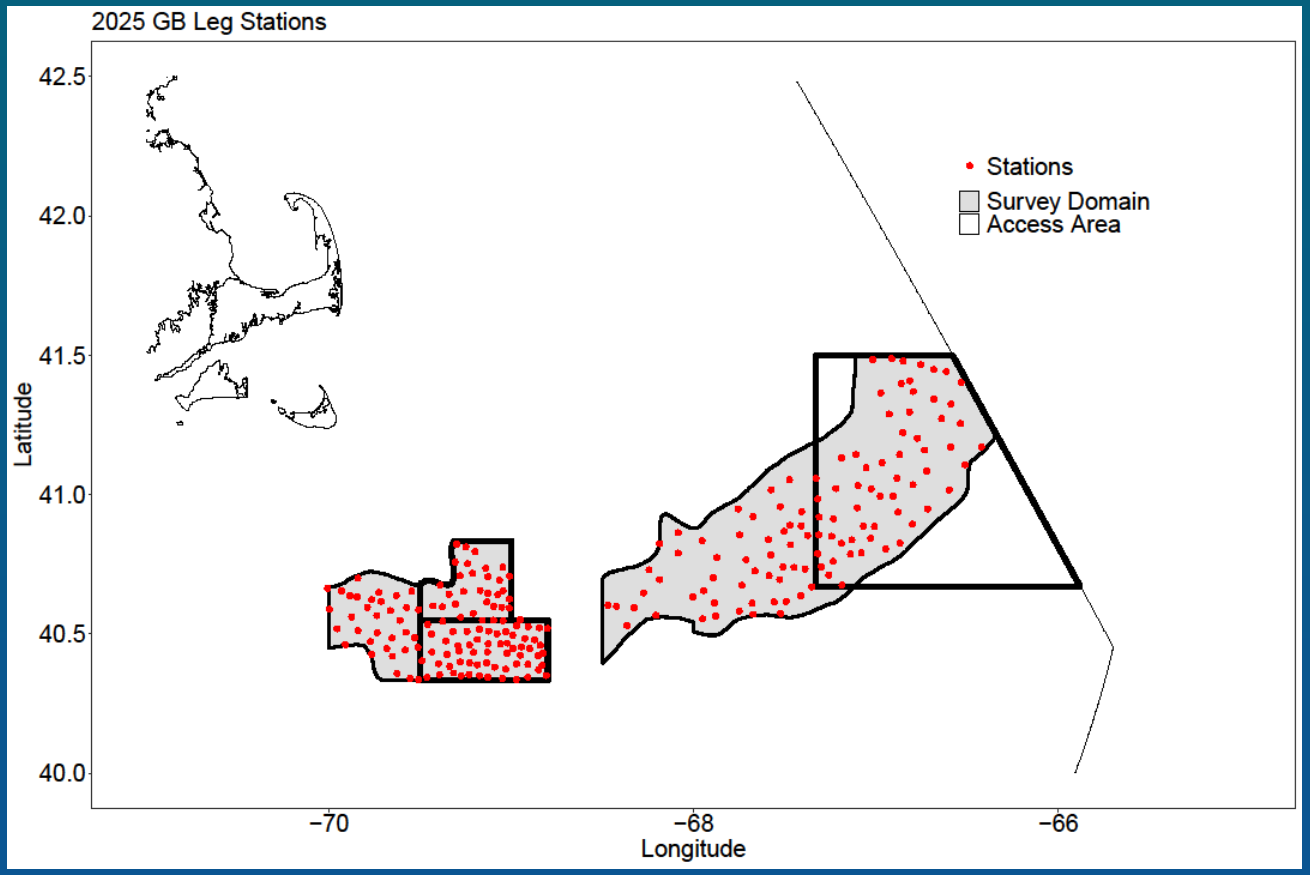


First Leg
- **F/V Carolina Boy**
- **6/3-6/13**

Second Leg
- **F/V Carolina Capes II**
- **6/21-7/1**

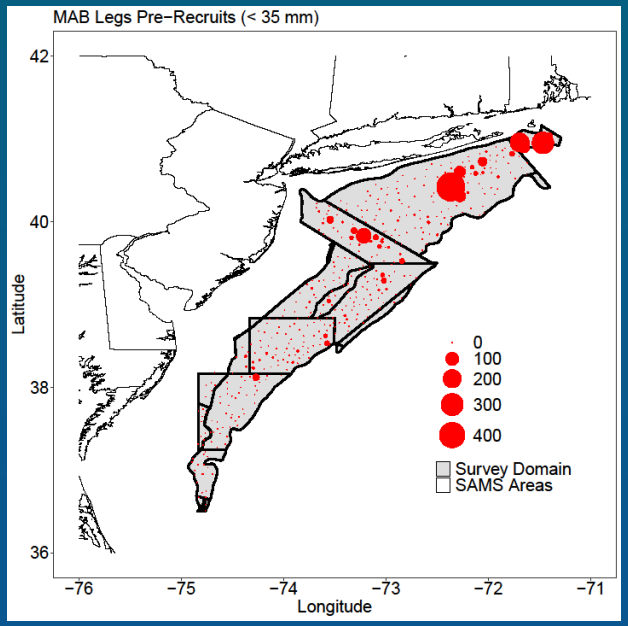
- **444 stations completed**

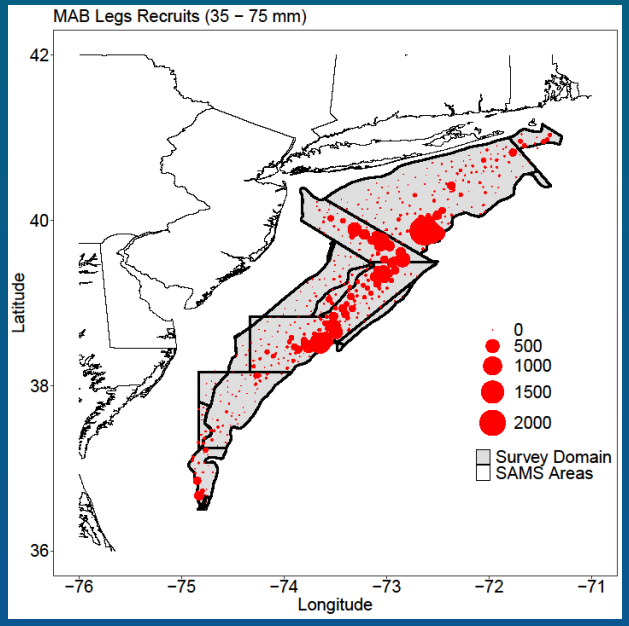
2025 GB Leg

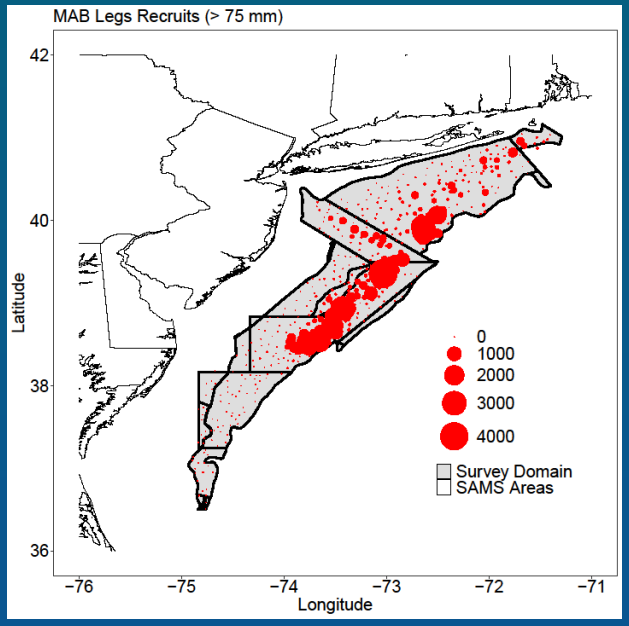


- F/V Atlantic
- 7/9 – 7/18
- 237 Stations completed

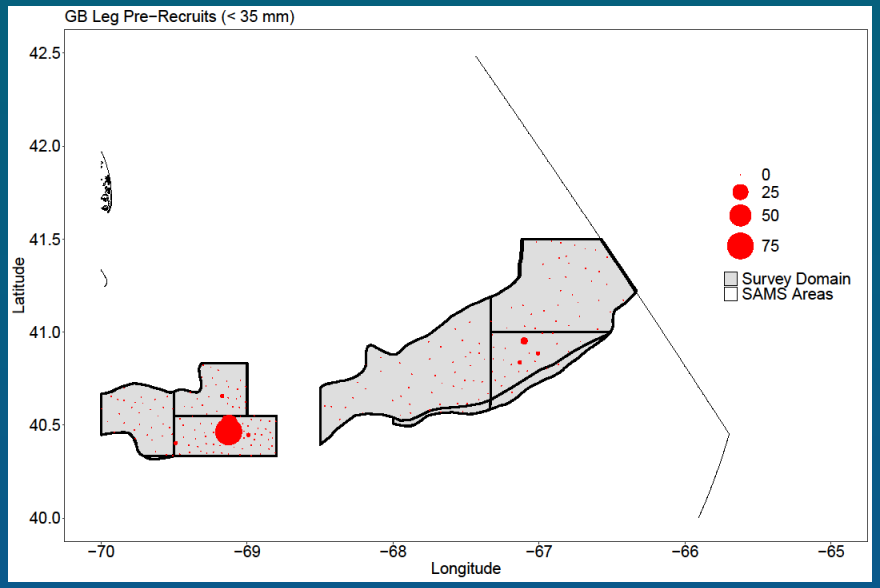
2025 MAB Legs
Scallop Distribution – Number per Tow

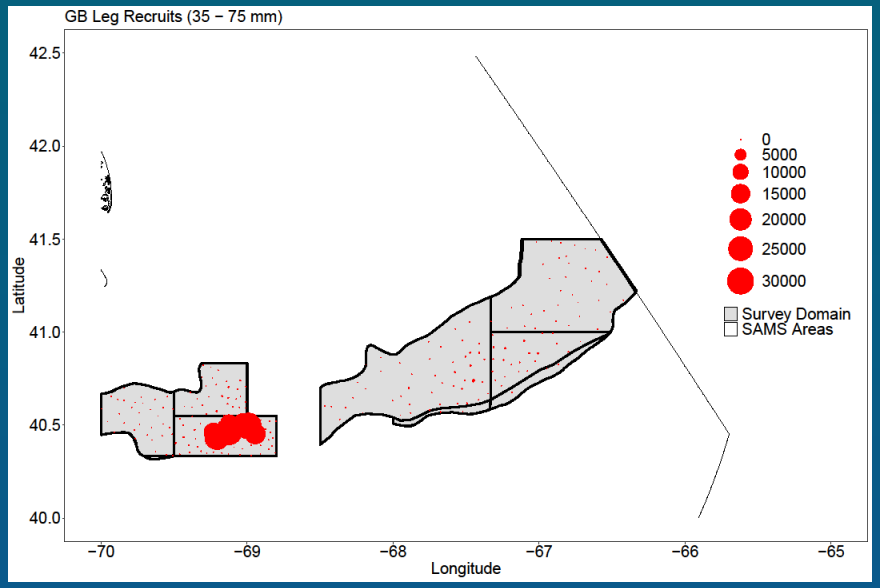


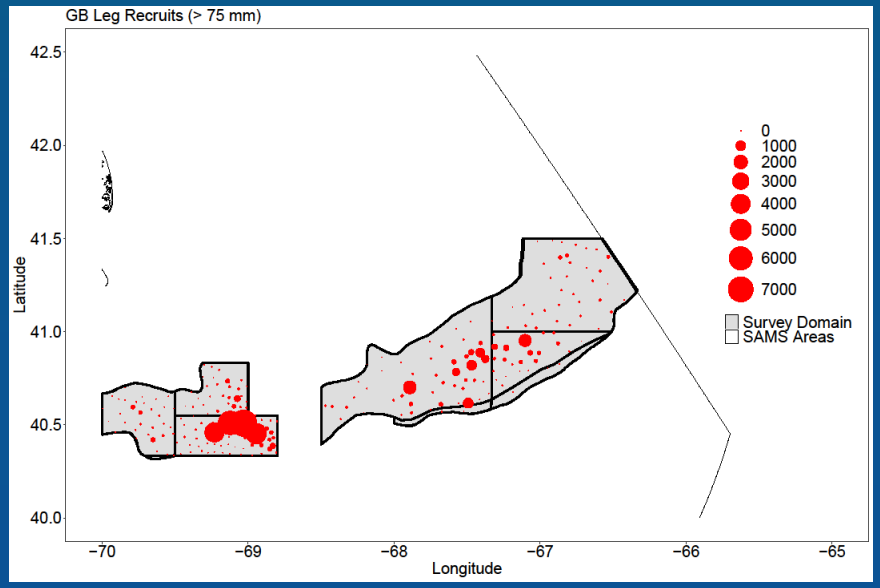




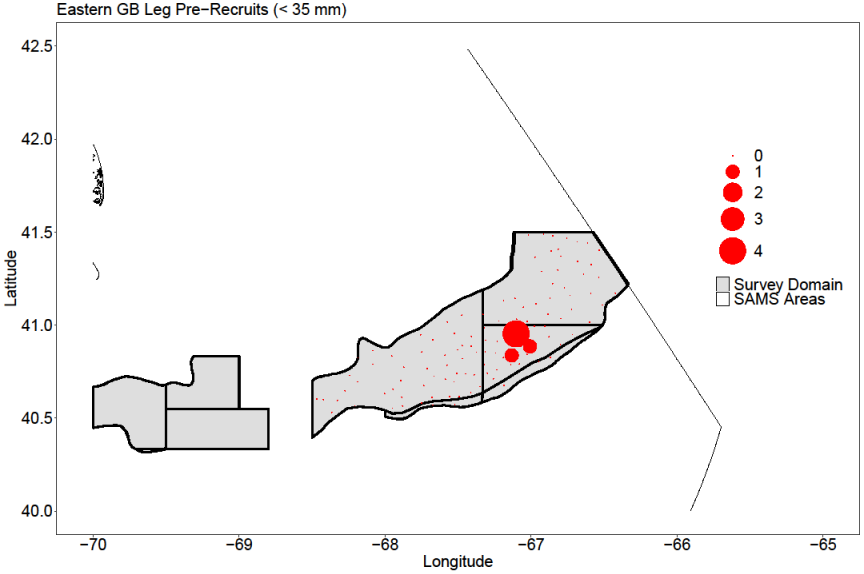
2025 GB Leg
Scallop Distribution – Number per Tow

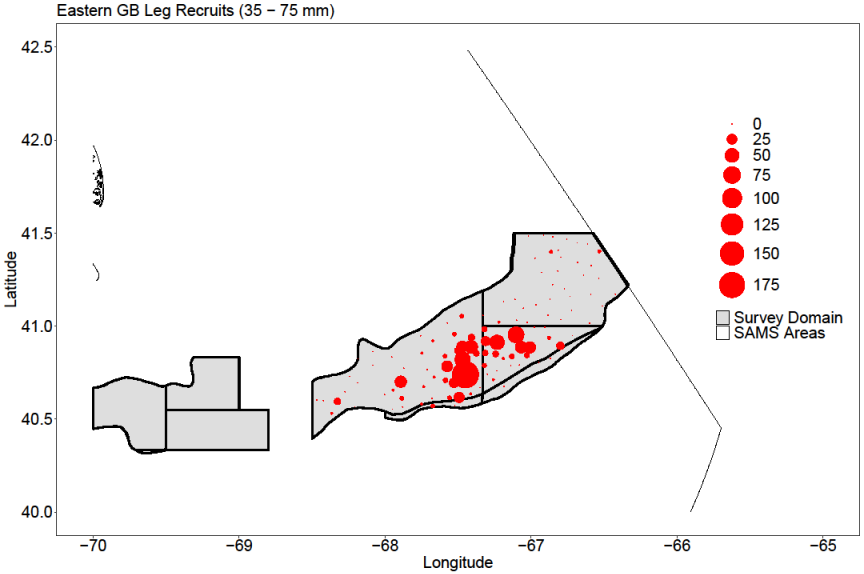


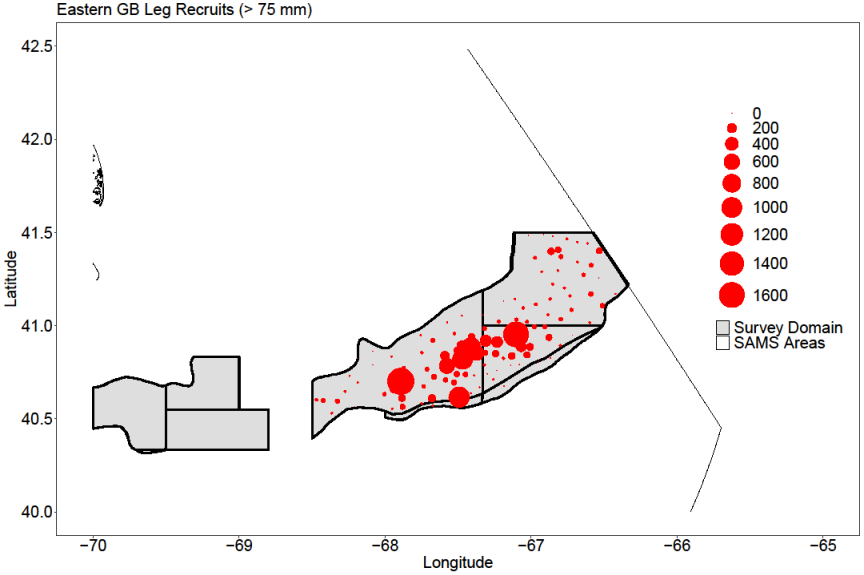




2025 GB Leg
Scallop Distribution – Number per Tow



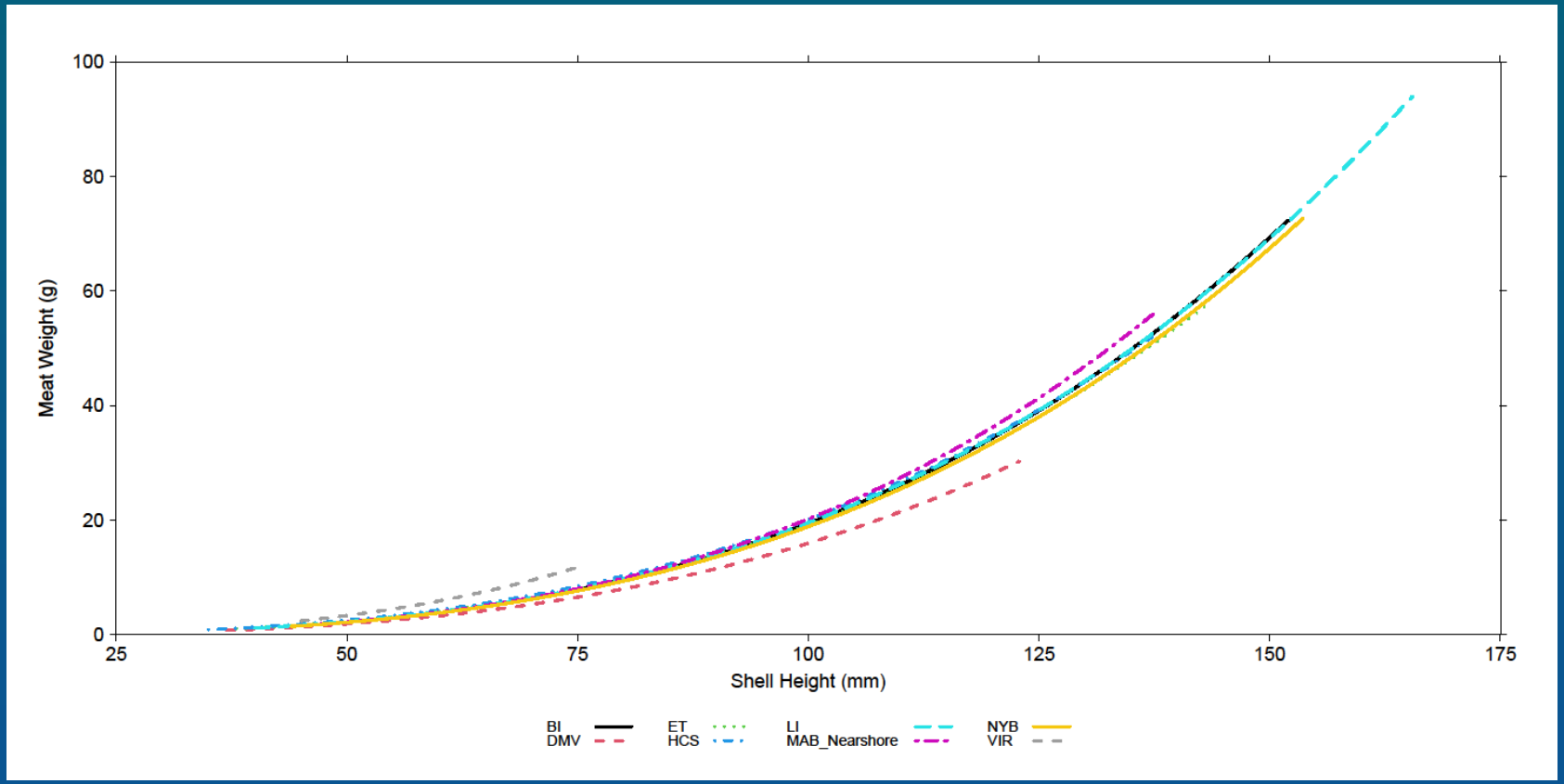




SHMW Relationship

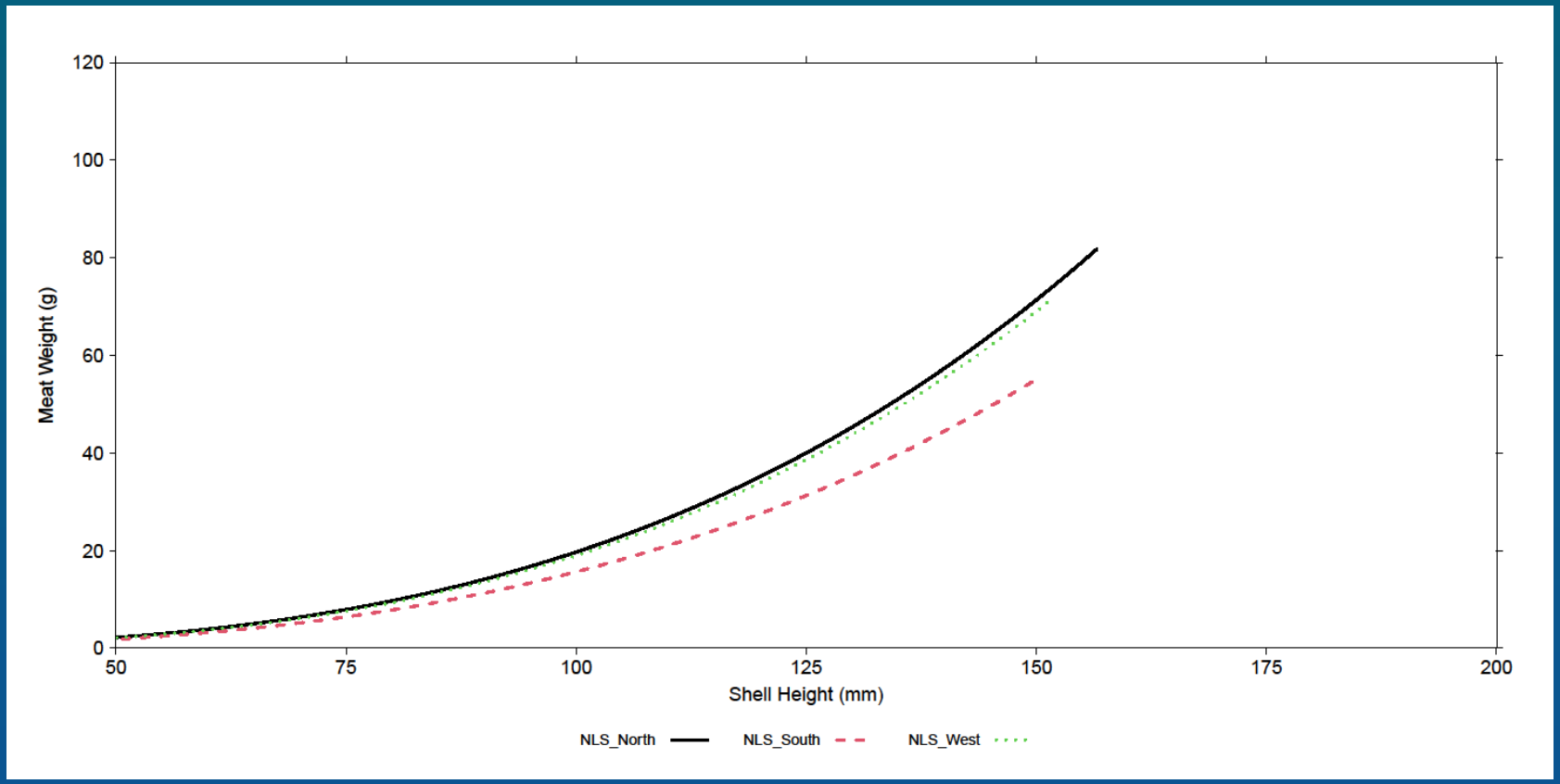
- SHMW samples (meat & gonad weight) were taken from all stations with scallop catch (15/station):
  - MAB Legs: 3,561 scallops, 331 stations
  - GB Leg: 2,493 scallops, 215 stations
    - NL: 1,203 scallops, 116 stations
    - CAII, etc.:1,290 scallops, 99 stations
- No minimum shell length
- Predict meat weight based on a suite of potential covariates (i.e. shell height, depth, SAMS Area)
- GLMM (Gamma distribution, log link, random effect at the station level)
  - SAMS Area included in all models

2025 MAB SAMS Area
SHMW Results



Northern gradient of increasing SHMW

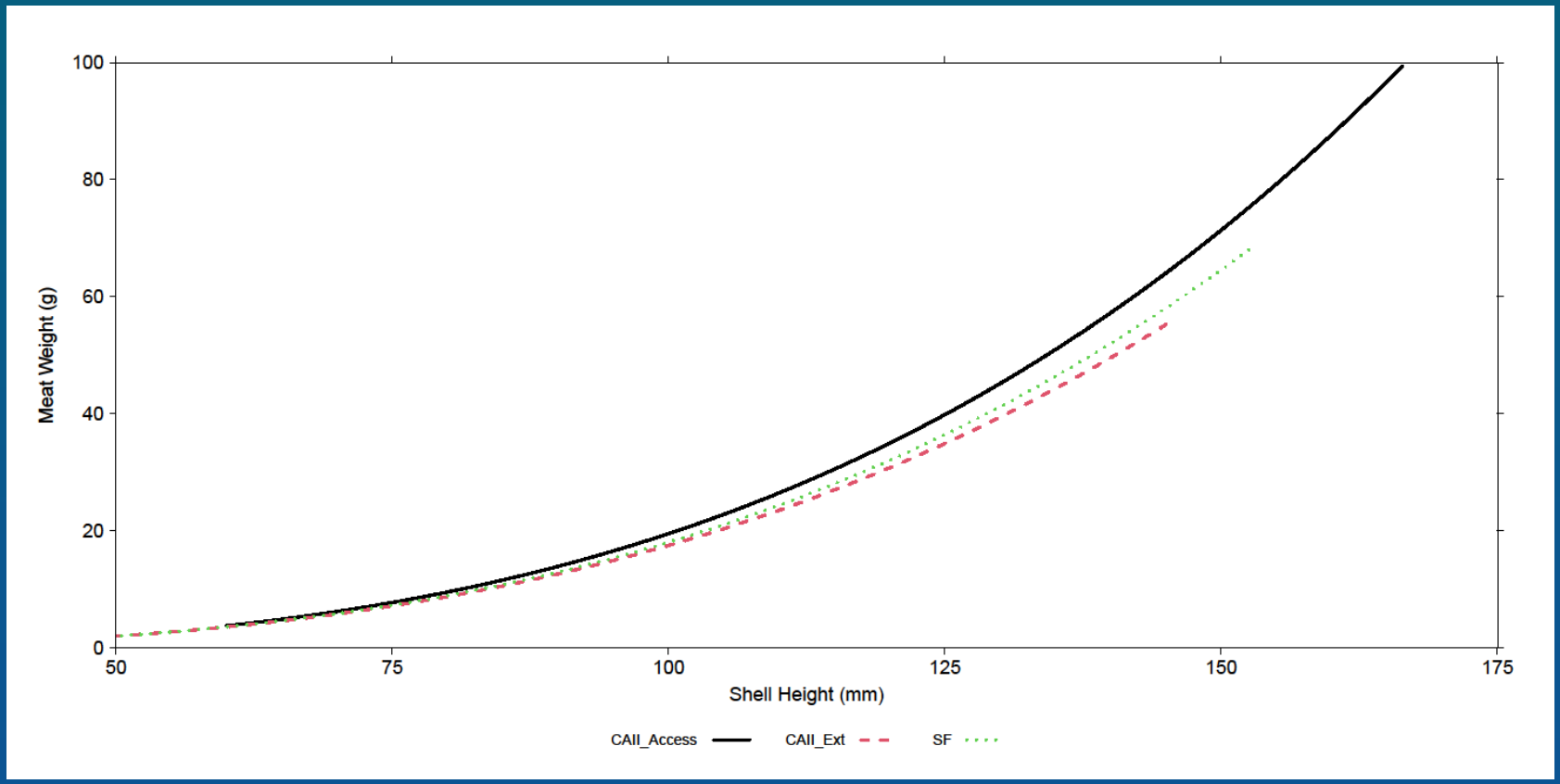
2025 NL SAMS Area
SHMW Results



Similar trend to previous years - South Deep SAMS Area has a low meat weight at shell height

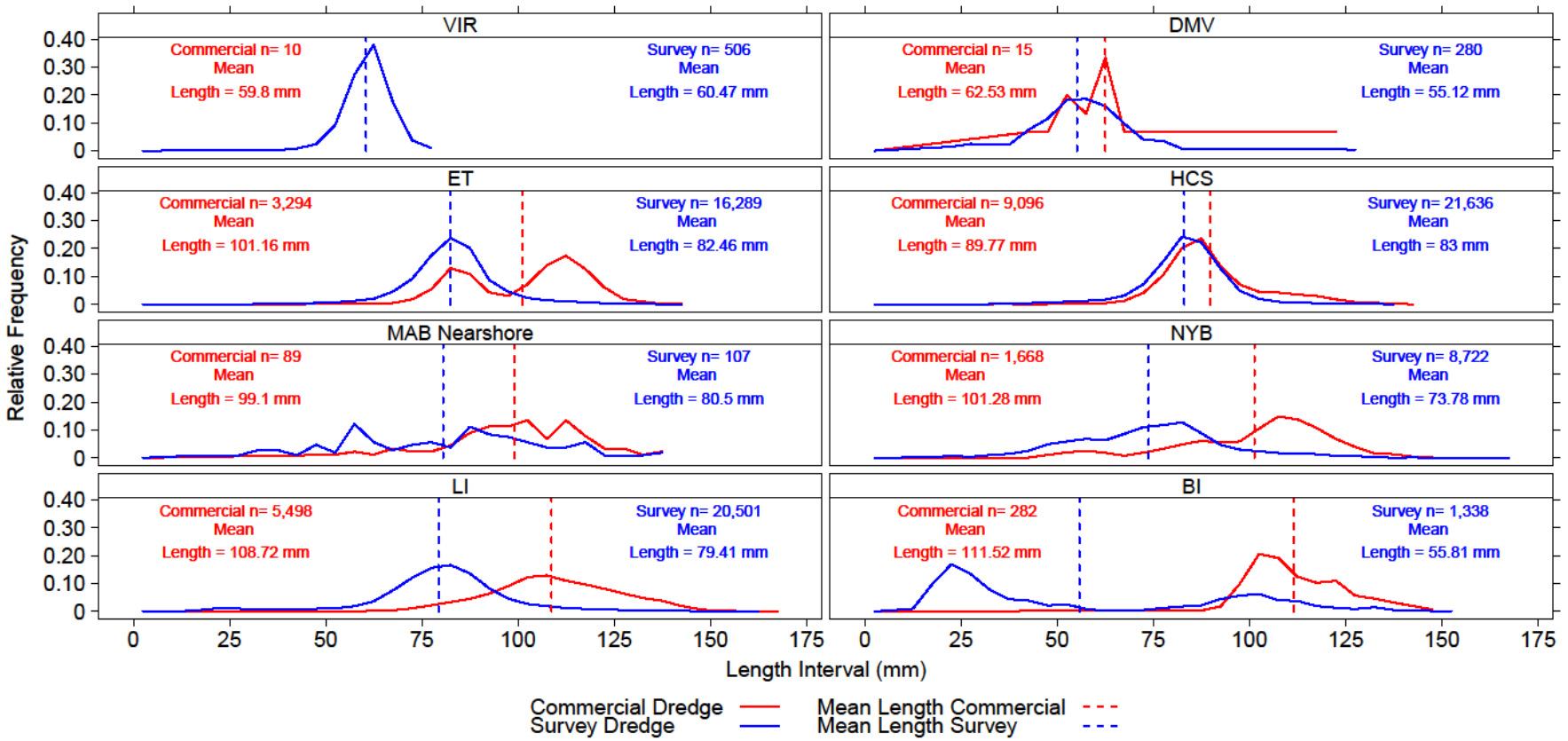
No significant difference between SAMS Areas

2025 SF, CA II Ext & CA II SAMS Area
SHMW Results

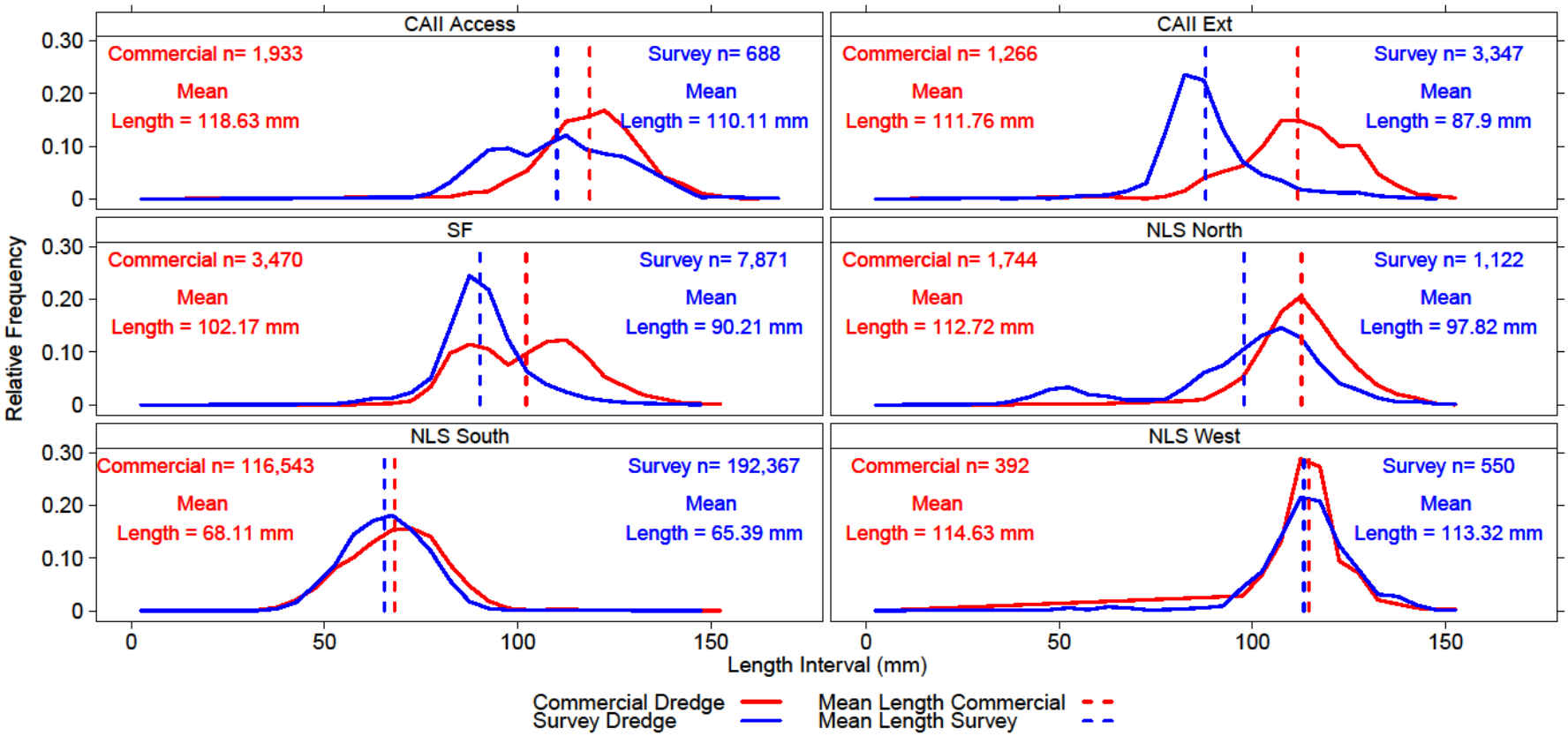


The traditional access area generally tends to have a higher meat weight for a given shell height

2025 MAB SAMS Area
Length Frequency



2025 GB SAMS Area
Length Frequency



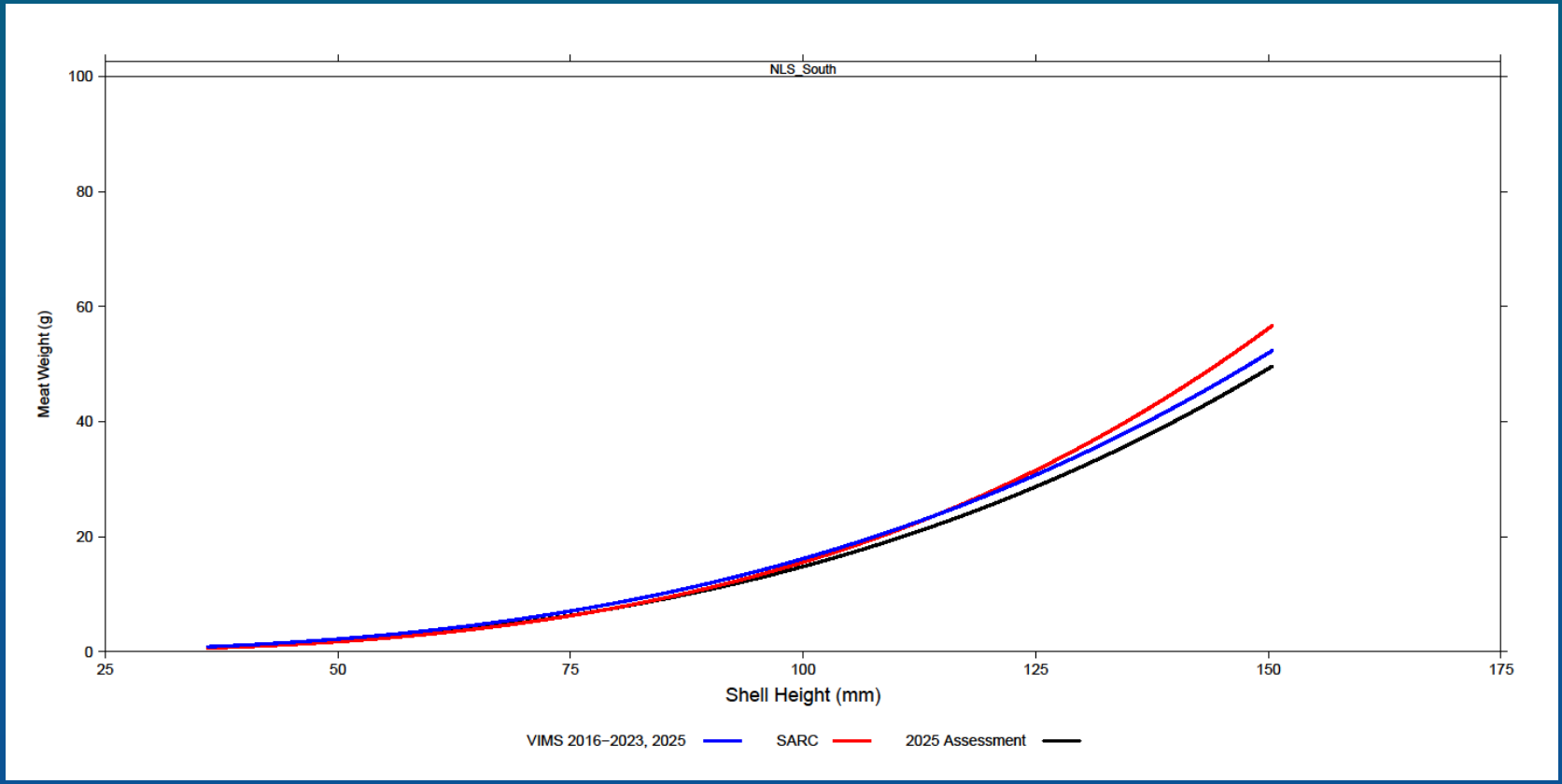
2025 Total Biomass Survey Gear

SAMS Area	Total Biomass (mt)	SE Biomass (mt)	CV Biomass (mt)	Density (scal/m^2)	Avg MW (g)	Total Number
BI	560.79	137.81	61.44	0.03	20.45	27,724,672.80
LI	12,234.68	1,357.22	27.73	0.08	12.32	999,623,610.51
NYB	4,799.50	400.64	20.87	0.08	10.47	467,462,065.36
MAB_Nearshore	77.53	10.18	32.82	0.0004	15.16	5,126,448.74
HCS	9,109.58	865.64	23.76	0.22	11.99	777,417,155.22
ET	4,307.51	323.95	18.8	0.14	11.72	362,444,760.56
DMV	47.18	5.16	27.35	0.0001	4.7	8,633,632.59
VIR	52.81	10.74	50.83	0.01	4.78	11,031,926.43
SF	3,145.69	303.53	24.12	0.09	11.61	259,956,140.31
CAII_Ext	1,356.74	216.23	39.84	0.07	10.84	123,503,188.22
CAII_Access	776.43	48.98	15.77	0.01	20.81	37,242,457.69
NLS_West	313.04	49.18	39.28	0.01	25.01	12,545,901.26
NLS_North	434.67	52.43	30.16	0.02	17.2	27,758,336.64
NLS_South	7,804.59	913.43	24.12	1.66	3.82	2,044,824,986.74

2025 Research Track Assessment SHMW for all SAMS Areas except NLS South (VIMS 16-23,25 SHMW)

SHMW Sensitivity – NLS_South

SAMS Area	Total Biomass (mt)		
	VIMS 2016-2023,2025 SHMW	2025 Research Track SHMW	SARC 65 SHMW
NLS_South	7,804.59	10,296.69	8,966.20



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  - *F/V Atlantic*
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