

Lobster Quality

Preseason Sampling Program

Southwest Nova Scotia LFA33 & LFA34

Preseason Summary Report

November 2023

Submitted by:

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2023 LFA 33 & 34 Lobster Quality Sampling Summary

HIGHLIGHTS FOR 2023

Preseason sampling took place from early September to mid-November during periods of good weather, calm seas. 4 inside and 4 outside sampling locations in LFAs 33 & 34. 44 preseason sampling dates and 6,071 lobster samples taken. Protocol are for 150 lobster samples per date; data collected for lobster sex, carapace length, blood protein (BRIX), hardness, moult stage, and egg-bearing status. The report focuses on BRIX trends over time and by location as the primary indicator of start of season lobster quality.

In 2023, average BRIX levels have improved over the preseason sampling period in most locations, while lobster landings per sample have declined noticeably in the Outside areas of St. Mary's Bay and Yarmouth. % Weak are down slightly however, % Soft+Medium lobsters have increased in the 2023.



This report summarizes results of preseason at-sea sampling in 8 locations within LFA33 and LFA34 from September 4 to November 14, 2023. This sampling represents a continuation of the longstanding Atlantic Lobster Moulting and Quality Project (ALMQ) 18-year longitudinal database that has continued uninterrupted since 2006.

Preseason sampling was conducted by Coldwater Lobster Association in 8 different locations – the designated ‘Inside’ and ‘Outside’ areas of Lobster Bay, St. Mary’s Bay, Yarmouth in LFA34, and Port La Tour in LFA33. Data analyses were carried out with the cooperation of the Centre de recherche marine/Marine Research Centre of the Université Sainte-Anne, Petit de Grat Campus. The 2023 preseason survey analysis on the status and prediction of lobster quality for the upcoming 2023-2024 commercial season was developed by the Centre de recherche marine/Marine Research Centre in collaboration with Coldwater Lobster Association and member partners of the southwest Nova Scotia lobster industry. We acknowledge this opportunity to maintain the ALMQ longitudinal database and to develop it for the future use by the industry.

The [Université Sainte-Anne Lobster Quality Centre \(LQC\)](#) acknowledges the financing for this project as a Scientific Partnership Grant from the Atlantic Fisheries Fund (AFF) award for 2020-2024 as well as the continuing support of Fisheries and Oceans, Canada, the Nova Scotia Department of Fisheries and Aquaculture and our industry partners.

As in previous years, individual lobster data on blood protein level (measured via a refractometer as the BRIX Index (mg/mL) – Figure 1), manual shell hardness (soft, medium or hard scale), moult stage (from selected lobster pleopod examination under a microscope), carapace length, and sex (male, female, berried female) data were collected manually for 6,071



Figure 1. Blood sample used in refractometer to determine lobster blood protein (BRIX) level

individual lobster samples over each of 44 sample location-dates.



These lobster data, collected manually on board survey vessels by the Coldwater technician (Figure 2) and recorded electronically, represent determinants of lobster quality. Quality lobsters are suitability for live storage and shipping, and high meat content for a superior dining experience. Lobster data analysed in this report are provided as indicators to the Nova Scotia lobster industry about the early season status of the post-moult lobster harvest in the eight designated sampling subareas of LFAs 33 & 34.

The results presented here focus on the distribution of the recorded BRIX levels for 2023 compared to past years' samples from the same preseason time and sampling locations over the full ALMQ database period 2006-2023. This information enables the industry to compare the 2023 sample results to known past years of observed preseason and subsequent in-season lobster quality and status.

Figure 2. Lobster preseason sampling equipment.

In 2023, as in the past, BRIX index values below 6.0 mg/mL in a sampled lobster provide a probable indication of “Poor” quality lobster that is less than fully-meated, that is also less suitable for the live market for storage and shipping and for presentation at the dining table. BRIX index values between 6.0–7.99 are deemed as “Moderate” quality and indicate that lobsters may still be recovering from a prior moult, and are of concern with respect to quality. BRIX levels at 8 or above are indicative of “Good” quality and are relatively more fully-meated lobsters and more suitable for live product storage and shipping and presentation for consumption. Table I below summaries the BRIX indicator categories used in this report.

Table I. BRIX Index Categories

Quality:	“Poor”	“Medium”	“Good”
Meat Content:	Most likely low	Not likely fully-meated	Likely fully-meated
Storage/Shipping:	Not ideal	Concerns	Likely suitable
Observed Lobster Quality Indicators:			
Blood Protein Level, BRIX index (mg/mL)	Less than 6.0	6.0 to 7.99	8.0 or greater
Shell Hardness	Potentially “Soft” (2)	Potentially “Medium” (4), recovering from previous moult	Likely “Hard” (5)
Appearance	Pale colour, evidence of carapace abnormalities, and/or shell disease	Acceptable colour, little evidence of carapace abnormalities or shell disease	Spring black-bodied, few carapace abnormalities
Shape/size	Culls, misshapen claws, damage to carapace	Small size, misshapen claws, limited damage to carapace	Commercial size, good body shape

The manual assessment of shell hardness is a subjective indicator of lobster quality. Guidelines are in place for manual estimates of shell hardness on a subjective scale of 2 (“soft”), 4 (“medium”), and 5 (“hard”). “Soft” lobsters are of poor quality, and “medium” lobsters are generally of mediocre quality. Most sampled lobsters

are subjectively judged to be “hard”. In 2023, as in previous years, shell hardness measures are not well correlated with continuous measures of lobster BRIX levels. Shell hardness measures are effective when used together with other information, e.g., lobster appearance, shape/size, weak status, and including information on when and where lobsters are harvested. Individual subjective indicators of quality, including shell hardness, are generally not considered as a sole determining factor in lobster quality prediction but may be used in conjunction with other indicators, e.g., BRIX, to assign quality to an individual lobster.

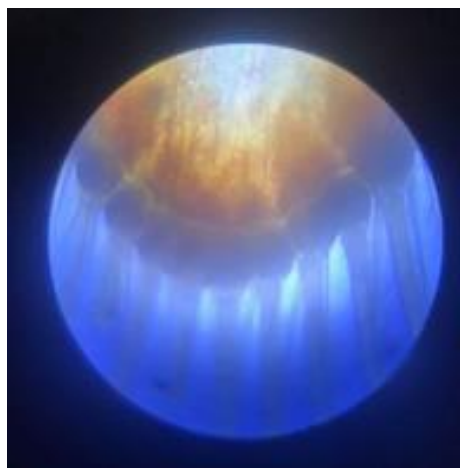


Figure 3. Lobster pleopod under microscope.

As per the ALMQ sampling protocol, 30 (male and female) lobsters are selected from each sample set of 150 lobsters per sampling location-date and have a pleopod removed. Each lobster’s moult status is determined by microscopic analysis of the lobster pleopod (swimmeret). Moult stage levels of zero (0) indicate no moult activity is pending; advanced moult stages (3+) indicate the moult is approaching and imminent. Pleopod analysis in female lobsters may also indicate the onset of the egg bearing cycle and the presence of cement glands. Figure 3 presents a view of the lobster pleopod for interpretation of moult stage by the reader.

Overview of the 2023 Preseason Survey

In 2023, a total of 6,071 preseason lobster samples were taken over the 10-week period from September 4 to November 14, 2023 over 44 sample location-dates.

2023 Survey Sites. Figure 4 below illustrates the Google map for southwest Nova Scotia survey sites in 2023. The inserted map table on Figure 4 illustrates a survey location in Port La Tour (Inside) that took place on October 12, 2023. The interactive map¹ enables users to examine in detail each of the survey points including identification of the starting string longitude and latitude, depth, bait used, weather conditions at haul, count of lobsters landed, average BRIX value of the sampled lobsters, and numbers of designated weak lobsters as a percentage of the sample.

¹ Readers may access the [Google Map of the Lobster Preseason Survey](#) by clicking the underlined designated hyperlink. The map also displays the sites of the 2023 preseason surveys as well as the 2020, 2021 and 2022 surveys. For further information on accessing this map, please contact: Daniel.Lane@uSainteAnne.ca.

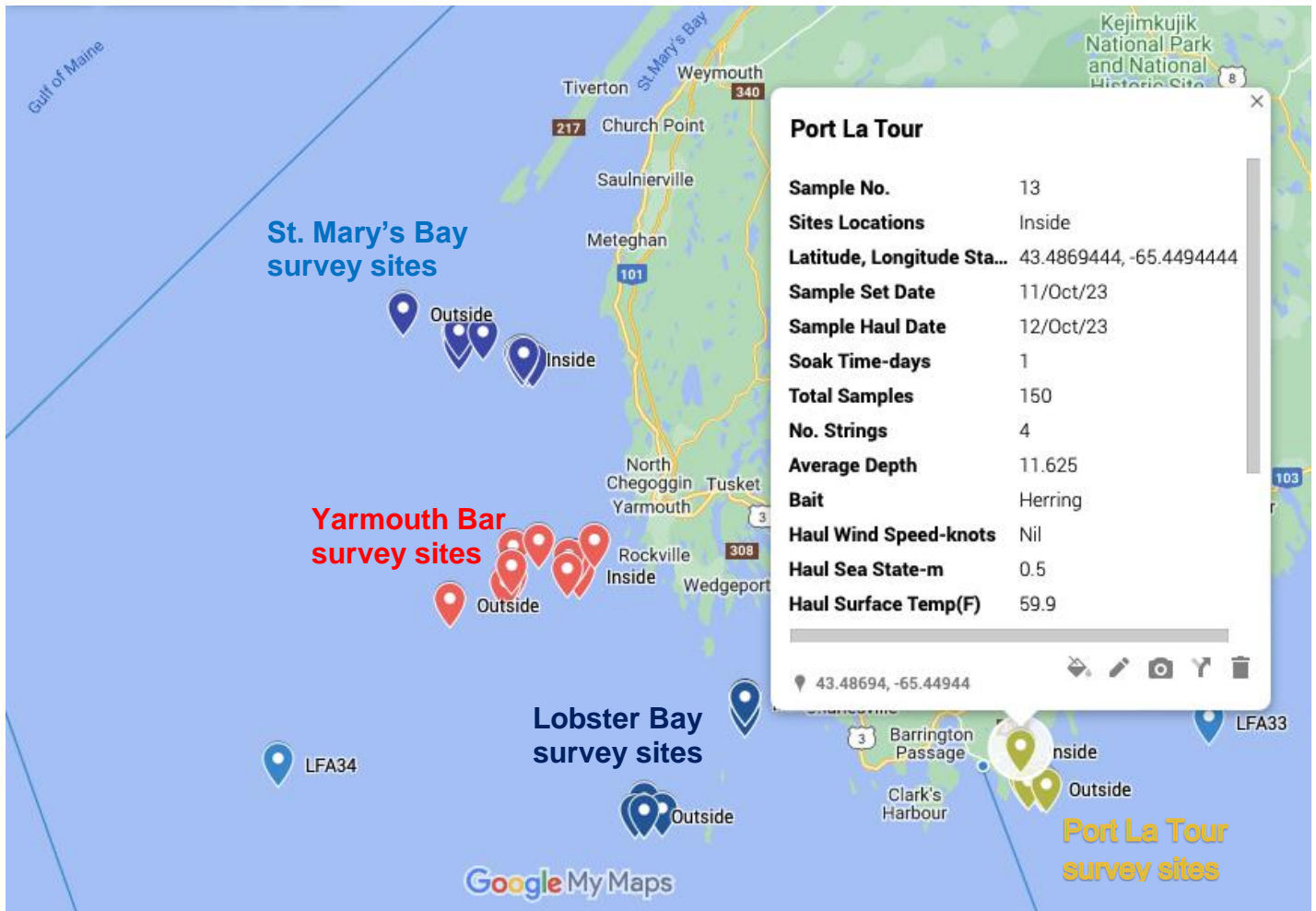


Figure 4. Map of 2023 Preseason Lobster Sampling Locations

2023 Program Participation. Sampling on the survey sites was executed with the assistance of southwest Nova lobster harvesters. These members (Table 2) used their fishing vessels to carry out the protocols of the ALMQ program with the assistance of the Coldwater Lobster Association technician. We acknowledge – with gratitude – their expertise and invaluable contribution to the ongoing work of the preseason lobster survey program in LFAs 33&34.

Table 2. Vessels Participating in the 2023 Lobster Quality Preseason Sampling Program

LOCATION	CAPTAIN	VESSEL NAME
St. Mary's Bay	K. Shaw	<i>Must N Tell</i>
Yarmouth Bar	K. Penney	<i>Betty Ann & Brats</i>
Lobster Bay	T. d'Entremont	<i>Jane Rose</i>
Port La Tour	W. Smith	<i>Relentless Pursuit 08</i>

2023 Weather Conditions. The weather during the 2023 pre-season survey was of very favorable conditions for the majority of the sampling days with the exception for the final two weeks (November) when the weather was less than favorable but sampling was achieved maintaining 150 sampled legal size lobsters.

2023 By-Catch and Other Observations. The St. Mary's Bay Inside location showed an increase of dogfish in the traps deterring lobsters from entering. The Port La Tour Outside location was very slow to produce lobsters indicating that they had not begun to move offshore in any abundance as the potential of moulting or recovery was still taking place into October. This also was notable for Lobster Bay, Yarmouth Bar and the St. Mary's Bay Inside locations.

Average BRIX levels observed at the beginning of the survey (September), were stable for Inside areas but dropped off somewhat in the Outside as more berried females, soft shell and “weak” lobsters started appearing more often in the traps. A shift from higher to lower lobster landings counts for Inside areas occurred around mid-October, while lower to higher counts of lobster began appearing in corresponding Outside locations. This is generally consistent with the movement of lobsters in LFAs 33&34.

It is acknowledged by fishermen in 2023 that waters remained cool through to mid-April before they started to see any significant increase in water temperature. The rise in temperature initiated the movement of lobsters and an increase in lobsters coming to the traps. Higher water temperatures later in the year could result in a longer moult period with more lobsters expected to have higher BRIX levels towards the end of the preseason survey in mid-November. As in 2022, late 2023 preseason samples toward mid-November showed incidences across most locations of higher BRIX values.

Table 3 below presents a summary of the survey results for each of the 44 location-date samples in the survey program. Table 3 also reports soft and weak lobster percentages by sample and overall, as well as average BRIX per sample and overall.

Table 3. 2023 Preseason Sampling Survey Program

Sampling Location	Area	2023 Sampling Date	Total Harvested Lobster Count (#)	Lobsters Sampled (#)	Sample %Soft/ %Weak	Sample Ave BRIX level (mg/mL)
Yarmouth	Inside	September 5	372	150	4.00%/8.67%	9.56
		September 21	854	150	1.33%/4.00%	9.80
		October 4	530	150	1.33%/7.33%	10.35
		October 17	588	150	2.67%/5.33%	11.24
		October 31	418	150	0.67%/7.33%	11.35
		November 14	340	150	1.33%/9.33%	11.18
	Outside	September 4	138	104	4.81%/4.81%	9.70
		September 20	339	150	3.33%/9.33%	9.40
		October 3	178	138	0.00%/5.07%	10.33
		October 16	346	150	2.67%/9.33%	9.55
		October 30	603	150	2.67%/16.67%	9.64
		November 13	308	150	9.33%/12.00%	9.38
Lobster Bay	Inside	September 12	896	150	1.33%/12.67%	9.11
		September 26	832	150	5.33%/14.00%	9.58
		October 11	648	150	10.00%/16.00%	10.19
		October 25	1095	150	4.00%/16.67%	11.40
		November 7	750	150	6.00%/23.33%	11.02
	Outside	September 11	312	150	2.00%/4.67%	10.10
		September 25	489	150	2.67%/24.67%	8.74
		October 10	930	150	4.67%/8.00%	9.95
		October 24	1410	150	1.33%/6.67%	10.58
		November 6	670	150	3.33%/21.33%	10.49
Port La Tour	Inside	September 13	252	150	4.67%/12.67%	7.62
		September 27	503	150	5.33%/5.33%	7.79
		October 12	452	150	1.33%/6.67%	10.43
		October 25	386	150	0.67%/2.00%	11.26
		November 8	301	150	0.00%/4.67%	12.31
	Outside	September 12	6	4	0.00%/0.00%	9.83
		September 26	1	1	100.0%/0.00%	7.00
		October 11	262	150	9.33%/41.33%	7.93
		October 24	232	150	7.33%/20.67%	8.68
		November 7	230	150	0.00%/14.00%	8.83
St. Mary's Bay	Inside	September 6	272	150	1.33%/14.67%	9.06
		September 22	481	150	2.67%/11.33%	8.75
		October 5	512	150	2.00%/8.00%	9.39
		October 22	618	150	1.33%/18.00%	9.42
		October 31	618	150	1.33%/18.67%	10.42
		November 14	331	150	0.67%/9.33%	11.03
	Outside	September 5	15	13	0.00%/0.00%	9.02
		September 21	115	111	1.80%/9.01%	8.45
		October 4	585	150	1.33%/7.33%	9.24
		October 17	488	150	4.00%/10.00%	8.93
		October 30	722	150	1.33%/26.00%	9.01
November 13	494	150	2.67%/18.00%	9.55		
TOTALS	8 location-areas	44 sample location-dates	20,922 lobsters landed	6,071 lobsters sampled	Overall % Soft/Weak 3.03%/12.37%	Overall Ave BRIX 9.78mg/mL

Review of the 2022 Preseason Survey Results

In 2022, a total of 7,283 preseason lobster samples were taken over the 4-month period from August 29 to November 16 (12 weeks) in the selected subareas of LFAs 33 and 34. The results indicated that lobsters landed at the start of the 2022-2023 season in southwest Nova Scotia, were of overall good quality with 2022 preseason samples average overall BRIX at the moderate level of 9.46 mg/mL. BRIX results indicated that 2022 lobster quality had improved relative to the lower quality regime experienced in southwest Nova Scotia since 2014.

In 2022, total landings (legal and sublegal lobsters) were 29,446 lobsters. This represented an increase of 24% versus the 2021 preseason survey landings of 23,715 lobsters, and an increase of 23% over the 2020 preseason survey landings of 23,870 lobsters.

From August to October 2022, all 8 locations showed elevated BRIX with no “Poor” observations during the early 2022 sampling periods. BRIX values declined in early October 2022 and then increased moderately or level off in the mid-October samples and toward the end of the sampling period in mid-November at moderate BRIX averages over 9 mg/mL. Near the end of the survey period in mid-November 2022, Inside areas outperformed the Outside areas with respect to BRIX levels. Outside areas for Lobster Bay and St. Mary’s Bay maintained BRIX levels at or above 9 mg/mL. Outside areas for Yarmouth and Port La Tour trailed below BRIX levels of 9 mg/mL.

The percentage number of “soft” and “weak” lobsters observed in 2022 preseason samples were 3.27% soft and 16.25% weak over all samples. These observations increased appreciably compared to the 2020 and 2021 percentages of 1%, 2% (soft) and 7%, 12% (weak) in the 2020 and 2021 preseason samples respectively. The overall average of Inside area weaks increased from 10% in 2021 to 15% in 2022 (a 50% increase). Similarly, the overall average Outside area weaks increased from 16% in 2021-2022 to over 18% in 2022 (a 12% increase).

Lobster hardness measurements also shifted in the 2022 preseason in comparison to the 2021 and 2020 preseason survey results. Counts of “soft” and “medium” scale lobsters together increased from negligible amounts (less than 5%) in 2020 to over 50% in selected sampling dates in 2022. These shifts are evident in Lobster Bay and Yarmouth Inside and Outside areas, but less so for Port La Tour in 2022.

2023 Preseason Summary Highlights

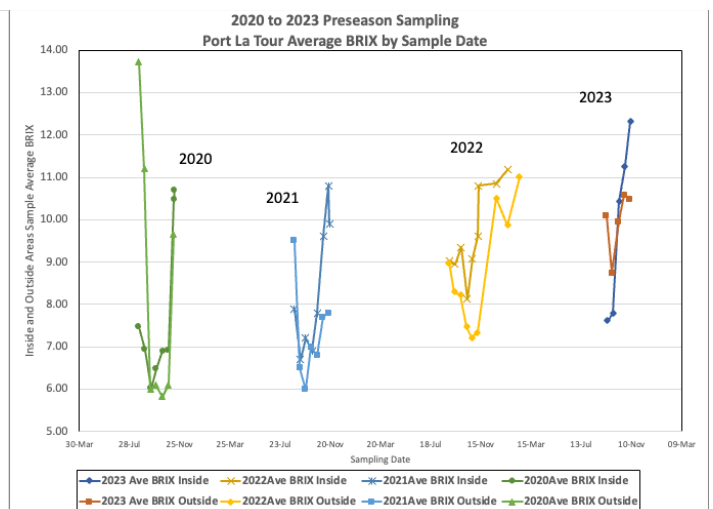
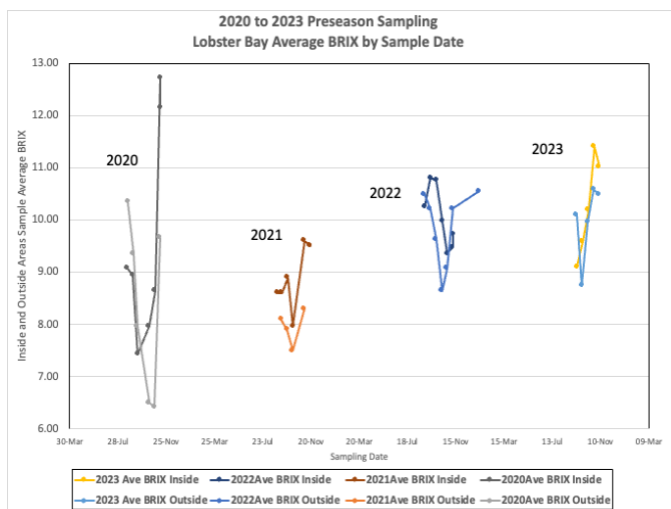
The 2023 Preseason Summary highlights are summarized below for: (1) BRIX level values; (2) lobster counts per trap; (3) lobster carapace hardness ‘soft’ and ‘medium’ values; and (4) percent weak lobsters in the samples.

Table 4 below presents the average BRIX results over all sample dates for each of the 8 locations in 2023. Summary statistics for landed lobster counts per trap by location as well as the percentage of weaks, and soft and medium lobster are also recorded. Table 4 also shows each location’s 2023 most closely comparable historical year(s) from the historical database. Finally, Table 5 below presents indicator predictor values for the summary indicators for the start of the 2023-2024 commercial season.

1) BRIX Level Values

In 2023, Inside area average BRIX levels per sample tend to rise over the preseason sampling dates from early September to the end of sampling period in mid-November at average levels varying from a low of 8 mg/mL (Port La Tour in September) to over 12 mg/ml (St. Mary’s Bay in mid-November). These average BRIX are indicative of average “Good” BRIX across all Inside locations and sampling dates in 2023. For Outside areas, average BRIX levels are more stable over the sampling dates. In Outside areas, average BRIX vary between low levels of 7 mg/mL (Port La Tour at end September) to 10.5 mg/mL (Lobster Bay in early November).

In the figures below, average BRIX values are shown for Lobster Bay and Port La Tour and include samples for both Inside and Outside areas and each of the indicated years 2020 to 2023. In the case of Lobster Bay, overall average BRIX values are rising from 2020 to 2023. In 2023, Lobster Bay average BRIX values are 10.26 (Inside) and 9.97 (Outside) and contribute to the overall trend of somewhat favorable Inside versus Outside BRIX in preseason sampling (Table 4). For Lobster Bay, these values still remain below the higher average BRIX of the 2006 to 2013 period.



For Port La Tour, overall average BRIX values are also rising annually from 2020 to 2023. In 2023, Port La Tour average BRIX values are 9.88 (Inside) and 8.49 (Outside) (Table 4). For Port La Tour, these values are improving, but remain slightly below the higher average BRIX of the 2006 to 2013 period from Port La Tour.

2023 preseason sampling results in LFAs 33 and 34 indicate that lobsters landed at the start of the 2023-2024 season in southwest Nova Scotia, appear to be of overall moderate (M) quality by comparison with the entire 2006 to 2022 preseason database. 2023 preseason samples average overall BRIX (Table 3) at the moderate level of 9.78 mg/mL, a 3% improvement in the overall BRIX average for 2022 (9.46 mg/mL).

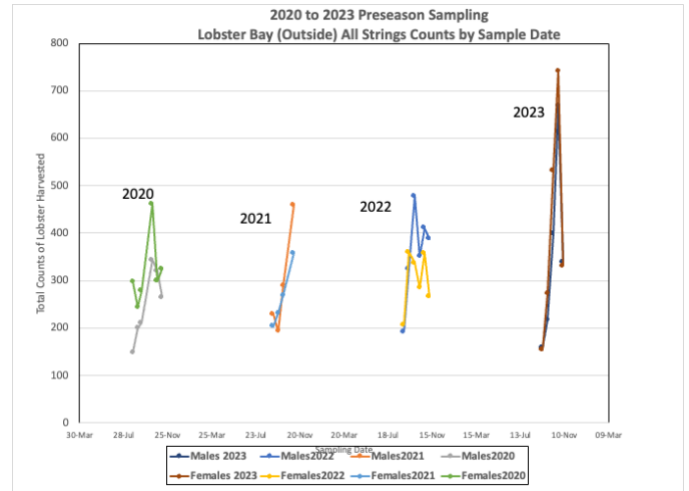
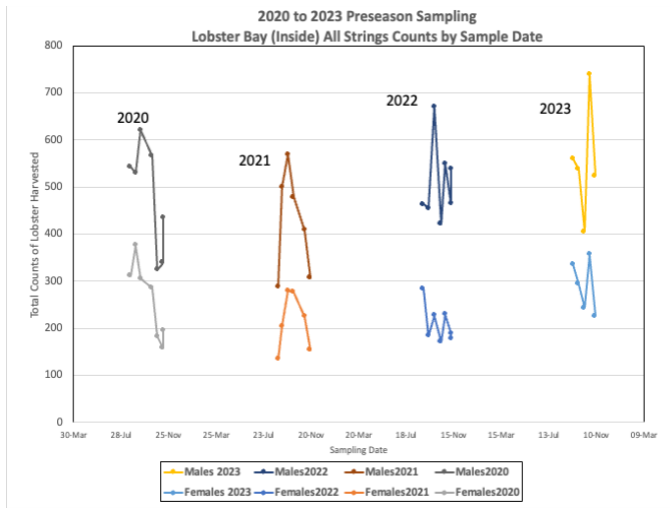
2) Lobster Counts Per Trap

In 2023, total landings (legal and sublegal, and male and female lobsters) were 20,922 lobsters. This represents a decrease of almost 30% versus last year's landings of 29,446 lobsters. The 2022 survey had an increase of 24% versus the 2021 preseason survey landings of 23,715 lobsters, and an increase of 23% over the 2020 preseason survey landings of 23,870 lobsters.

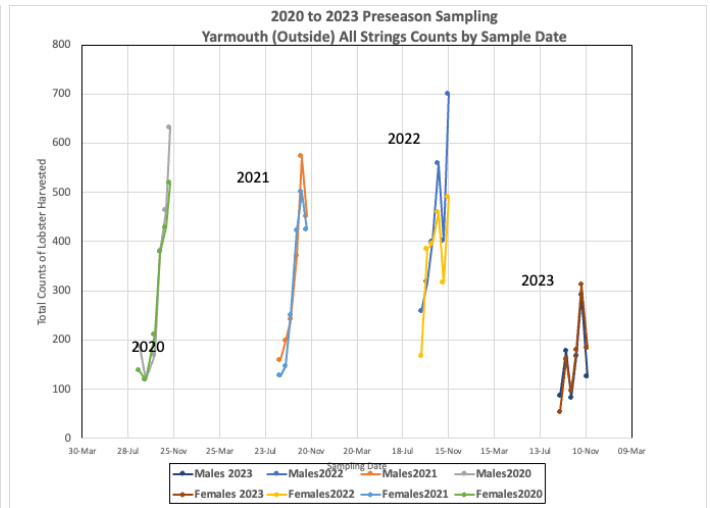
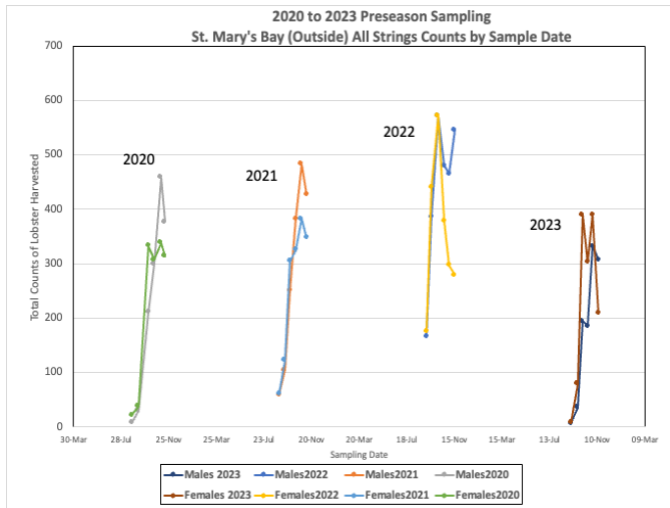
Previous surveys carried out different numbers of preseason sampling locations-dates. In 2023, 44 location-dates were sampled compared to 50 (2022), 51 (2021), and 52 (2020). Differences in the preseason sampling location-dates explain, in part, differences in total annual preseason survey lobster landings. To examine comparable differences in sampling counts of lobster, the measure of total (legal and sublegal) lobsters landed per sample are determined for each year 2020 to 2023. The results are summarized for selected locations in the figures below. Table 4 also presents the average legal sized landings of lobster counts per trap in the 2023 samples for each location. Legal landings of lobster counts per trap are also shown for each location and compared to historical years 2020-2022 in each of the 2023 preseason locations section below.

In the figures below, Inside and Outside total (legal and sublegal) counts are illustrated for Lobster Bay annually for each preseason sample over the years 2020 to 2023. Lobster Bay is unique in that there is a clear separation of males and females in the preseason samples' landings in the Inside area. With respect to legal lobster counts per sample (Table 4), Lobster Bay counts per trap for 2023 are comparable in the Inside area (13.91 lobsters/trap) and the Outside area (14.68 lobster/trap). These relatively higher count statistics are consistent year-over-year in Lobster Bay compared to the other locations.

As for the interannual differences in total counts, 2023 may be considered to have slightly higher counts per trap than the 2020-2022 period in Lobster Bay. However, these differences are not statistically significant. The expectation is therefore that catches in the commercial fishery in 2023 will be similar to past catches in Lobster Bay, Inside and Outside areas based on the similarity of total counts and legal counts per trap over time.



The figures below are provided for Outside areas of St. Mary’s Bay and Yarmouth for 2020 to 2023. These figures illustrate clear differences between the 2023 Outside area counts by sex (legals and sublegals) and the comparable past years’ results (2020-2022) for these two areas. Notably, St. Mary’s Bay Outside appears to show a slight increase in counts per sample over the period 2020 to 2022 followed by a sharp decline in the 2023 total counts per sample of almost -50% compared to 2022 total counts per sample. For Yarmouth Outside, the average decline in total counts per sample in 2023 is -60% compared to the 2022 average total counts per sample as illustrated below.

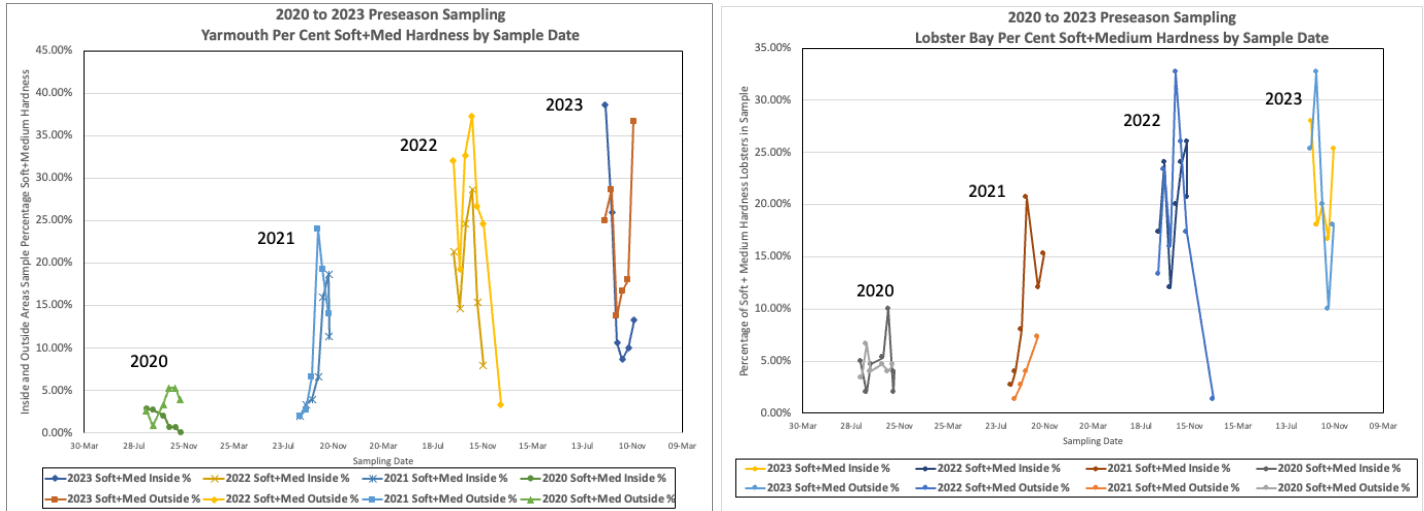


In the case of these sharp year-over-year declines in landings per sample, the expectation is that catches in the commercial fishery in 2023 will be lower in the Outside areas of St. Mary’s Bay and Yarmouth based on the total counts and legal counts per trap over the past years 2020-2022. In terms of counts per trap, over all 8 locations, average legal counts per trap in 2023 (9 legal sized counts per trap) are down by 24% compared to 2022 values (11.83 legal sized counts per trap).

3) Lobster Carapace Hardness in Samples

Lobster hardness measurements also shifted in the 2023 preseason in comparison to the 2022 to 2020 preseason survey results. The graphs below for Yarmouth (Inside and Outside) and Lobster Bay (Inside and

Outside) compare the counts (in percentage of the 150 samples protocol) of the combined counts for “Soft” (Hardness scale=2) and “Medium” (Hardness scale=4) for the preseason survey dates over the 4-year reporting period, 2020 to 2023. Counts of soft and medium lobster increased from negligible amounts (5%) in 2020 to over 30% in the selected sampling dates in 2023 for both Yarmouth and Lobster Bay. These shifts in 2023 are evident in Port La Tour Inside and Outside areas but less so for St. Mary’s Bay.



4) Percent Weak Lobsters in Samples

The percentage “weak” lobsters observed in 2023 preseason sampling was 12.37% weaks over all samples (Table 3). These observations are an improvement in the weaks statistics relative to the 2022 results and they approach the 2021 level of weak lobsters in the preseason samples.

In 2023, weaks in the Inside locations averaged 10% per sample – an improvement over the 2022 value of 14.5%. Similarly, in 2023, weaks in the Outside locations averaged over 15% per sample – an improvement over the 2022 value of 18%. Lobster Bay and St. Mary’s Bay (figure below) dominated the incidence of weaks (16% and 13% respectively in Inside areas, and 13% and 12% in Outside areas, respectively). These higher values are compared to the overall average of weaks in all areas of 12.37% in 2023 (Table 3). Yarmouth weaks are lower overall in Inside and Outside areas with averages (7% and 9.54% respectively, Table 4) below the overall mean of 12.37%.

The illustration for Port La Tour (Inside and Outside) in the figure below depicts the dynamics of weaks from 2020 to 2023. It is typical of all areas that weaks percentages of samples tend to become more varied, i.e., wider, over time with gradual increases from lower 2020 values trending to higher percentage values in 2023.

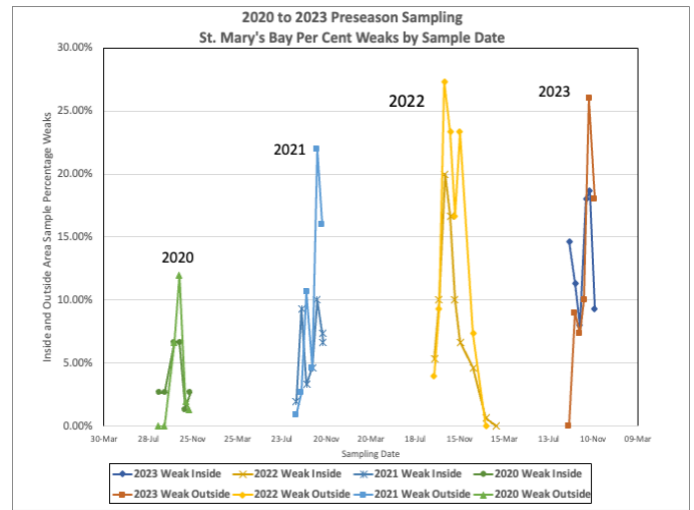
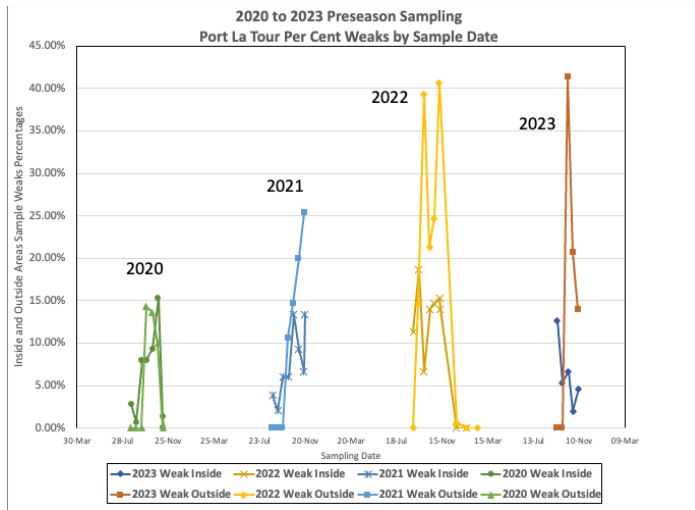


Table 4 below summarizes the 2023 preseason samples results for: (1) average BRIX level values over all preseason samples by location; (2) average lobster counts per trap; (3) average lobster carapace ‘soft’ and ‘medium’ percentage values in location’s samples; and (4) percent weak lobsters in the samples by location; and (5) each location’s 2023 most closely comparable historical year(s) from the historical 2006-2022 database.

Table 4. 2023 Preseason Sampling Summary Results

Locations: 2023 Preseason Samples	Yarmouth Inside	Yarmouth Outside	Lobster Bay Inside	Lobster Bay Outside	Port La Tour Inside	Port La Tour Outside	St.Mary's Bay Inside	St.Mary's Bay Outside	Average Overall Locations
Average BRIX	10.58	9.65	10.26	9.97	9.88	8.49	9.68	9.07	9.70
Ave Legal Counts Per Trap	8.32	6.41	13.92	14.68	7.06	2.80	9.95	9.38	9.07
Ave % Soft+Med	17.89%	23.16%	21.60%	21.20%	17.07%	41.32%	21.67%	24.31%	23.53%
Ave % Weaks	7.00%	9.54%	16.53%	13.07%	6.27%	15.20%	13.33%	11.72%	11.58%
Comparable Years	2020, 2013	2013	2018	2022	2020	2012	2022	2022	2022

5) Berried Females Observations

Berried (egg-bearing) females were examined in considerable detail again in the 2023 preseason surveys. Of the 44-sample location-date combinations, 37 captured at least 1 berried female (“seed”) lobster and as many as 54 (max – Lobster Bay Inside, October 25 sample). The average observed was approximately 8 berried females per sample date or 3.6% (350) of all female lobsters captured (9,711) during the 2023 preseason survey dates. The 2023 berried females numbers were the largest in the recorded dataset to date. In 2020 through 2022, those figures were 2.5% (270 berried females on 10,851 female lobsters captured in 2020), 1.6% (165 on 10,435 in 2021), and 2% (245 on 12,434 in 2022) respectively. Berried female analyses also recorded carapace size, clutch fullness, egg stage and condition. Analyses of these and other berried female data are provided in further detail in the full report of the 2023-2024 Preseason and In-season Lobster

Quality Sampling Program to be released in March 2024.

Summary of 2023 Predictors

Predictors for the start of the commercial season (end-November to mid-December 2023) are provided:

- (1) average BRIX level values by 8 locations;
- (2) average lobster counts (legal sized) per trap by 8 locations;
- (3) average lobster carapace ‘soft’ and ‘medium’ percentage values in each location; and
- (4) average percent weak lobsters by location.

The logic for establishing the list of predictors is based on the extension of the observed 2023 preseason samples’ results into the start of the commercial season for 2023-2024. From the start of the commercial season (scheduled for Monday, November 27, 2023), lobsters are preparing to move from the post moult stage to the premoult stage over the winter of 2023-2024. The premoult stage is characterized by hardening of lobster shells and lower incidence of lobsters with soft and medium scale carapaces, and lower incidences of otherwise weak lobsters. Estimates of these predictors into the mid-December period anticipate the rate of improvement of lobster quality status overall.

Finally, the estimate of counts per trap takes into account the increased catchability of lobsters as well as the draw down in catchable lobster abundance in each location following the initial start of season fishing effort intensity. As evidenced from the data, the participation of the commercial fleet immediately after the season opens results in fishing effort that leads to a precipitous decline in catch counts of lobster per trap in all locations into the December-January period. Table 5 below presents the estimated predictor values based on the above assumptions to mid-December.

Table 5. 2023 Preseason Sampling Predictors to mid-December 2023

Locations: Predictors	Yarmouth Inside	Yarmouth Outside	Lobster Bay Inside	Lobster Bay Outside	Port La Tour Inside	Port La Tour Outside	St.Mary's Bay Inside	St.Mary's Bay Outside
Average BRIX (mg/mL)	10	9.5	11	10.5	10.5	8.5	10	9.5
Ave Legal Counts Per Trap	5	5	6	5	4	4	5	6
Ave % Soft+Med	10%	15%	15%	15%	10%	20%	10%	10%
Ave % Weaks	5%	8%	15%	12%	5%	10%	5%	10%

The predictor values in Table 5 are presented here to test the ability of this report in mirroring the results at the start of the commercial fishery. It is anticipated that feedback from industry about the viability of these predictors will assist in improving these predictor results based on the preseason sampling program.

Overall in 2023, BRIX levels across all locations are expected to remain high as lobster proceed from post moult to premoult status. There is concern – especially in Outside areas – for a decline in commercial catch rates, as indicated by the comparable fall in counts per trap over the sampling period especially in St. Mary’s Bay and Yarmouth Bar where catches may be expected to drop by as much as 30% relative to previous

years. Consistent with rising BRIX and the eventual improvement in the status of lobster quality on LFA33 and 34, the percent weaks and soft and medium lobster is expected to fall over all locations into Dec 2023.

2023 Preseason Survey Results by Subarea

In the information on the 2023 survey which follows, sample results by BRIX category are shown for each of the 8 sampling locations. Results present: (A) BRIX category series trend for the 2023 samples; (B) comparable BRIX category preseason sampling 3-4 weeks before the start of the commercial season for years 2012 to 2023; (C) lobster (legal-sized) counts per trap for each sample in 2023 compared to comparable results in 2020 to 2022. The trends are described and predictions for the 2023 start-of-season are presented.

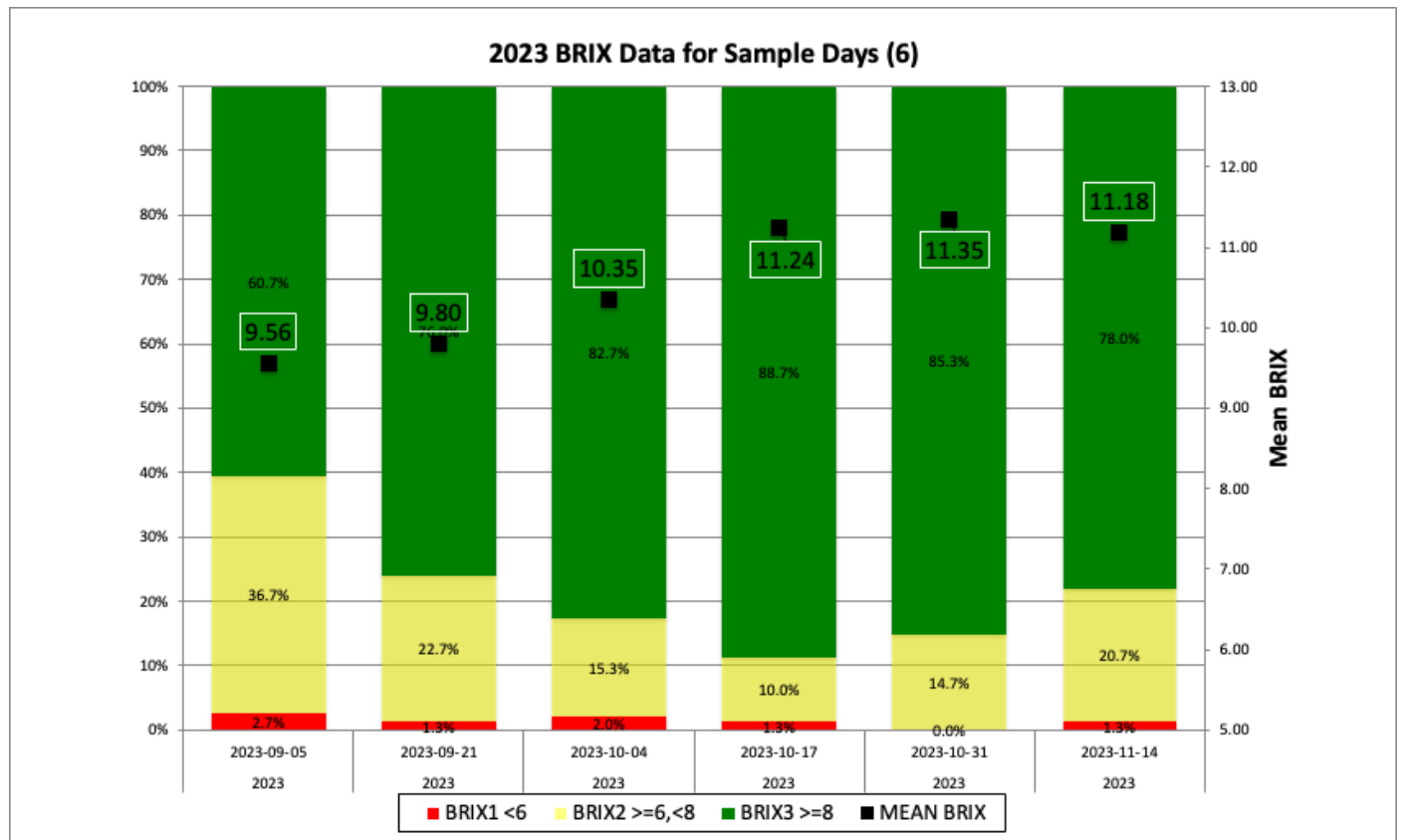
- (A) Blood Protein (BRIX) Categories. The following pages present the survey breakdown of the 2023 BRIX results for each of the 8 lobster sampling locations. Results are provided for the BRIX indicator values (“Good”, “Moderate”, “Poor”) for each location’s 2023 sampling dates (see also Table I – BRIX Index Categories above).
- (B) Annual graphics also compare recent years (2012 to 2022) to the current year (2023) sample mean BRIX, and BRIX distribution by category at the end of the annual survey 3 to 4 weeks prior to the start of the commercial season. Knowledge of BRIX values and lobster moult dynamics at the end of the survey period are used to provide a prediction of expected commercial average BRIX values provided for each of the 8 sampling locations.
- (C) In 2023, the accumulated (male and female lobsters) results of legal-sized total counts per trap that occurred in the survey dates and in past year’s preseason sampling, 2020-2022 are presented. These survey values provide an indication of the potential catch per trap for the start of the commercial season and are also used in this report as an approximate predictor of commercial catch rates for each of the 8 sampling areas presented below.

YARMOUTH INSIDE

2023 SUMMARY OF RESULTS

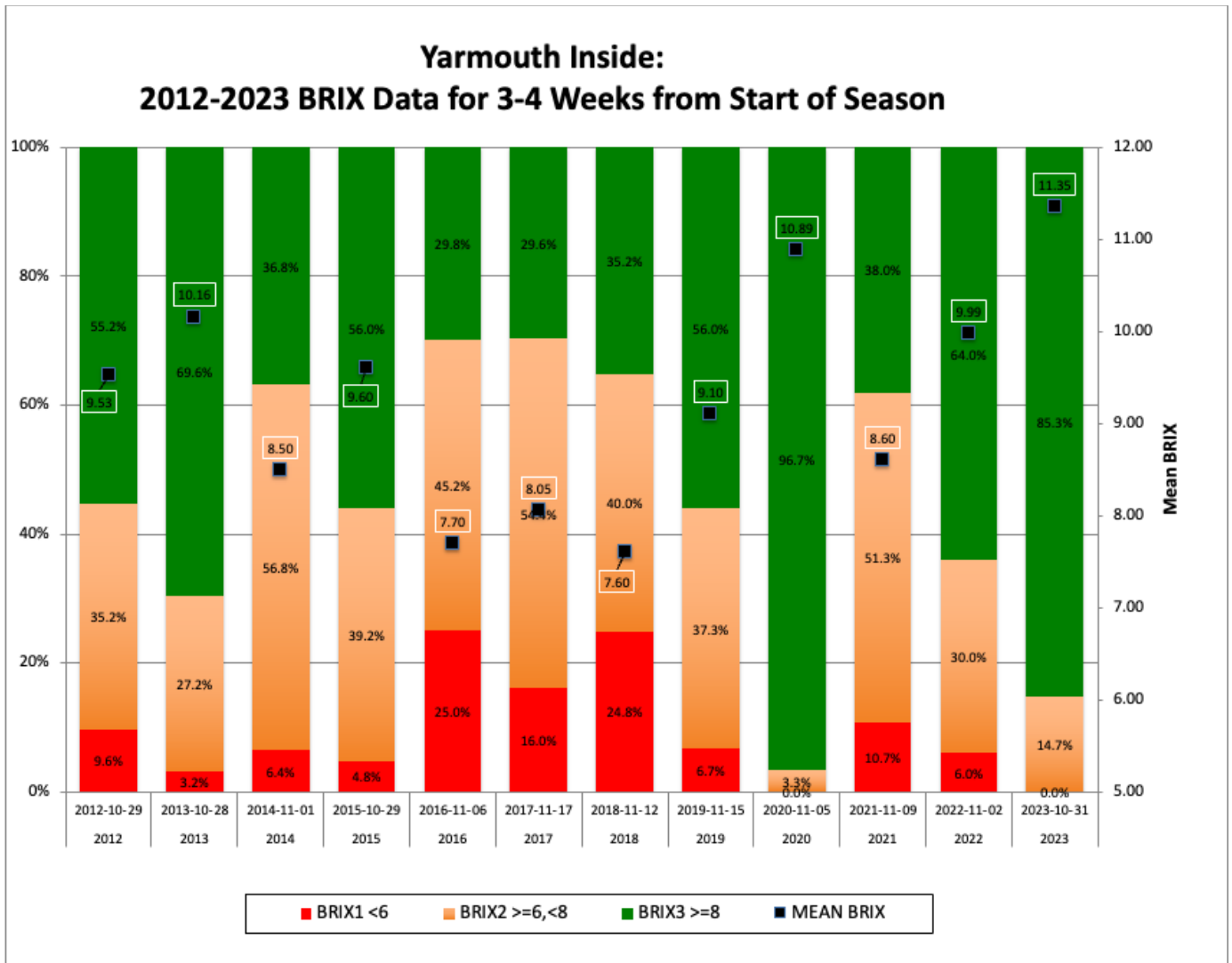
(A) Blood Protein (BRIX) Categories–2023 Samples

In the figure below, 2023 preseason survey results for 6 sample sites in Yarmouth Inside show a steady rise in average BRIX from early-September to late-October samples. After October, approximately 80% of each sample attained “Good” levels of BRIX (≥ 8 mg/mL). The proportion of “Poor” lobsters (BRIX <6 mg/mL) sampled in Yarmouth Inside remains below 3% of all samples in 2023. Average BRIX level values for samples in 2023 (10.6 mg/mL) were slightly above (approximately +10%) values for 2020 through 2022.



(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

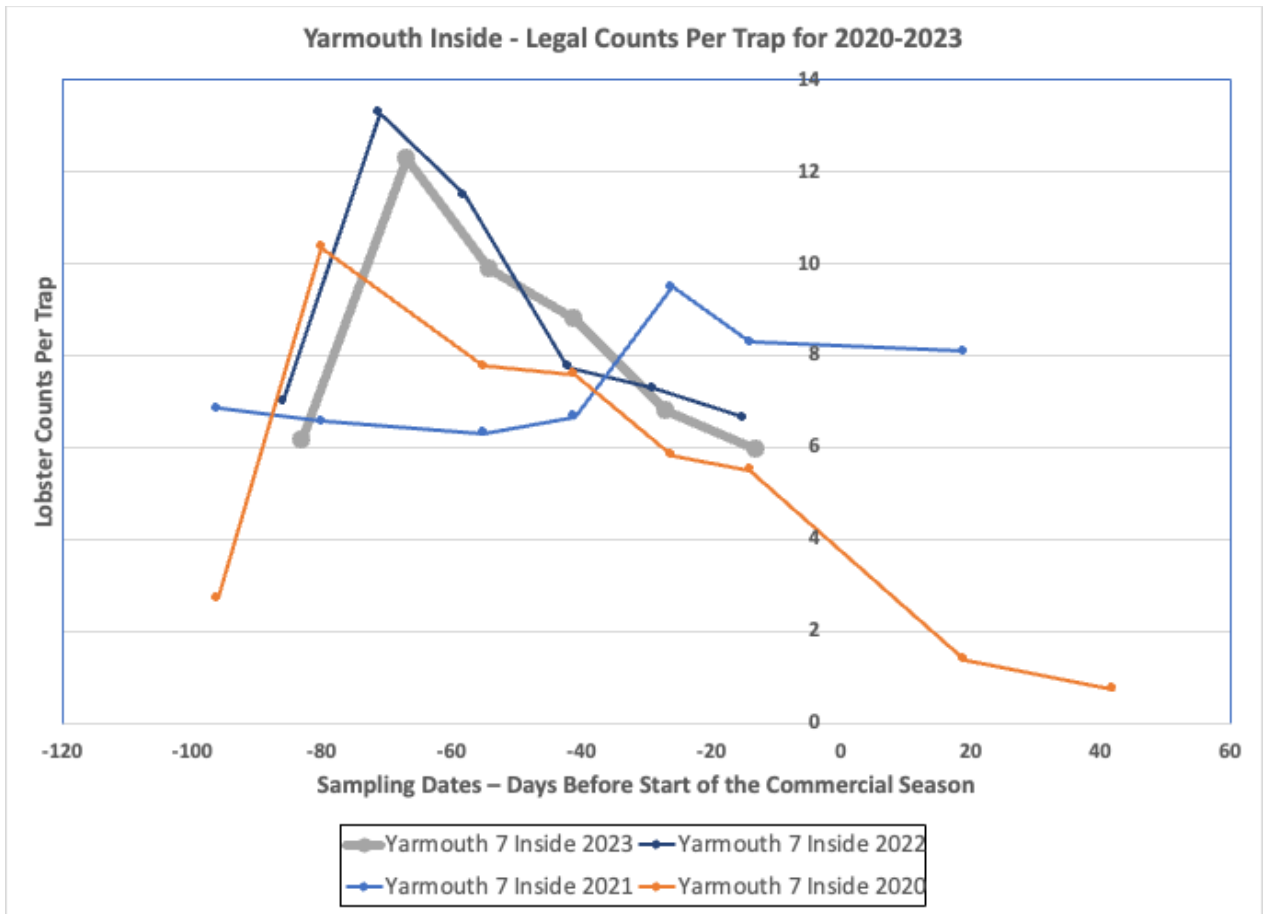
From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are variable across the series from 2012 to 2023 for Yarmouth Inside. The 2023 sample (October 31) has the highest BRIX average (11.35 mg/mL) in the series. The October 31, 2023 sample is comparable to the November 5, 2020 sample, the second highest BRIX mean in the series, with comparable BRIX category values.



Another comparable year to 2023 is 2013 – third highest BRIX mean in the series. 2013 is the final year of the higher BRIX regime (2006-2013) after which overall BRIX levels across the 8 locations remain in a lower BRIX regime (since 2014).

(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) lobsters that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years’ samples (2020-2022). The counts for Yarmouth Inside are comparable to past years’ counts. With the exception of 2021, the time series of counts over the preseason in Yarmouth Inside exhibit a rise to end-September and then fall (by 50%) to the end of the sampling period (mid-November). As evidenced by the 2020 in-season sampling in the figure below, commercial catch rates are expected to fall precipitously after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 Yarmouth Inside samples were slightly below past years (2021-2022) values averaging 7% per sample versus 10% (2021). The average percentage of Soft and Medium lobsters per sample (18%) fell slightly compared to 2022 (19%) but were twice that of 2021 (9%).

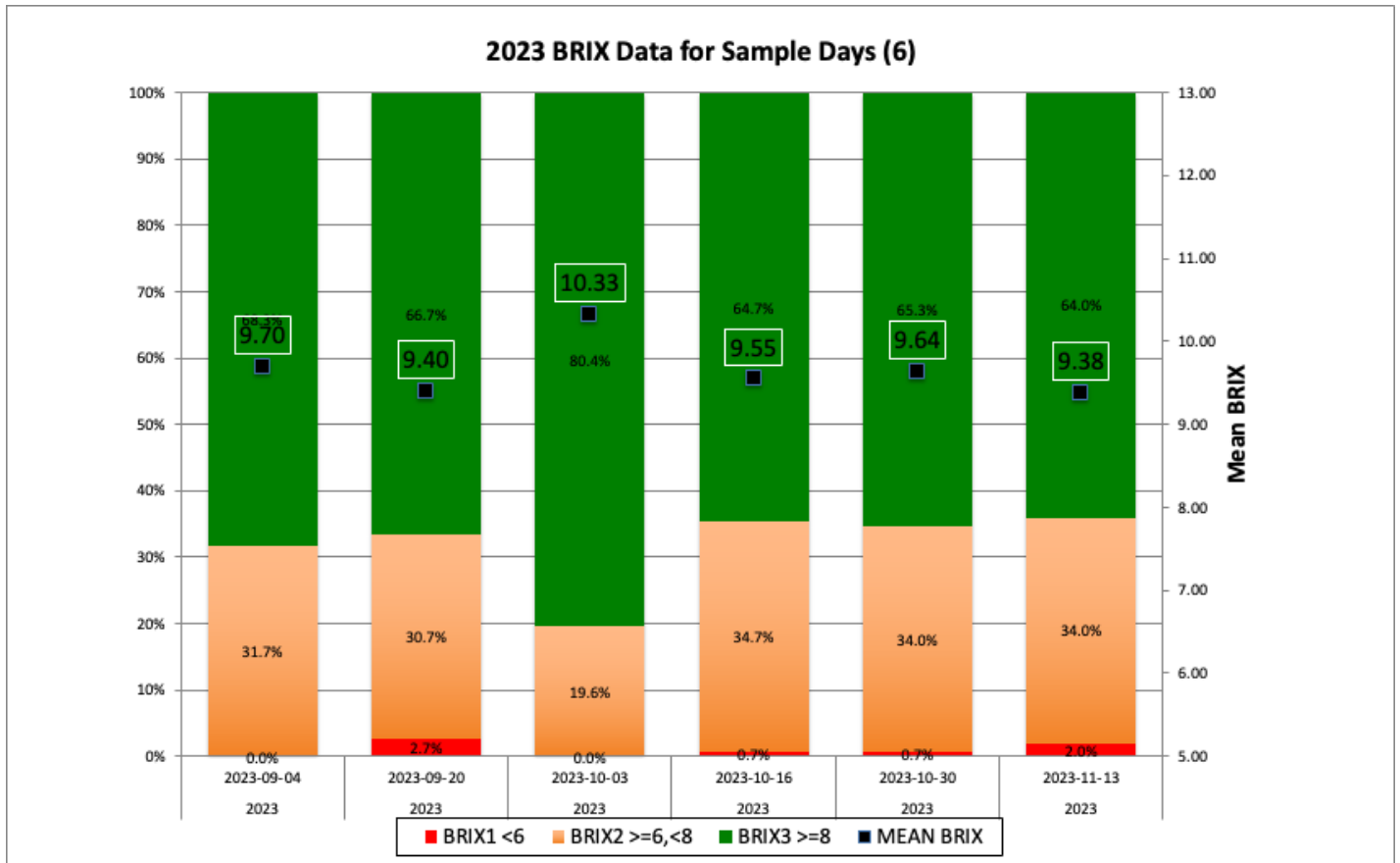
YARMOUTH INSIDE – Summary

- 1) *Yarmouth Inside shows a steady rise in average BRIX from early-September to late-October samples. After October, approximately 80% of each sample attained “Good” levels of BRIX (≥8 mg/mL).*
- 2) *Yarmouth Inside Lobster Quality Category for 2023 samples are classified as “Moderate” (M). It is expected that relatively high BRIX will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is most comparable to 2020 and 2013, periods of good quality lobster in those commercial fisheries.*
- 3) *Yarmouth Inside sampling counts are comparable to past years’ survey catch counts. It is anticipated that Yarmouth Inside initial commercial catch rates will be similar to recent years.*
- 4) *Yarmouth Inside Weak (7%) and Soft and Medium (18%) lobsters percentages were similar to 2022 levels but higher than the 2021 and 2020 percentage values.*

YARMOUTH OUTSIDE

2023 SUMMARY OF RESULTS

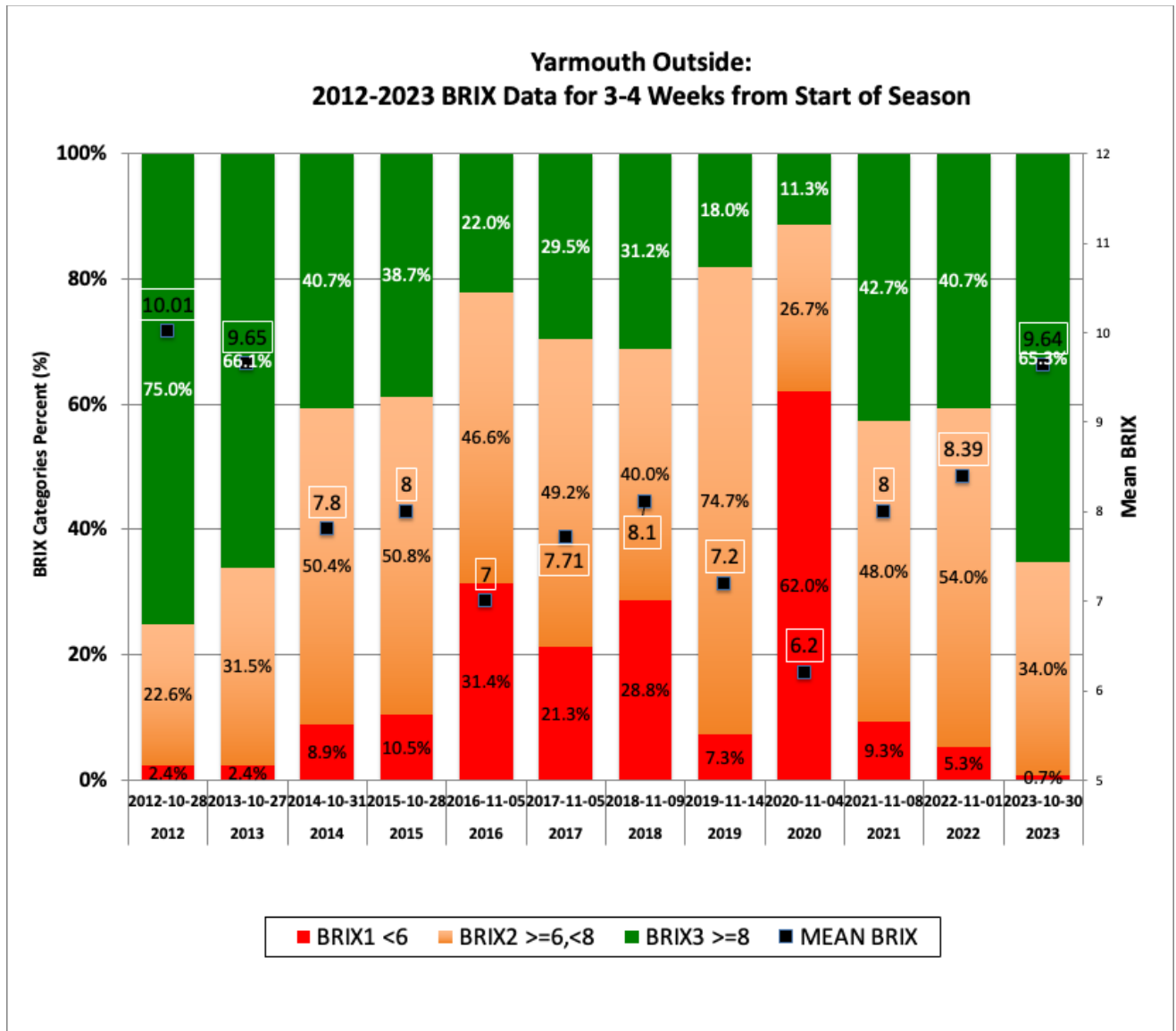
(A) Blood Protein (BRIX) Categories–2023 Samples



The 6 preseason samples in 2023 for Yarmouth Outside show a relatively constant average BRIX between values of 9.38 mg/mL (November 13) and 10.33 mg/mL (October 3). Throughout sampling, the percentage of “Good” category lobsters (BRIX≥8) varied between 64% (November 13) and 80% (October 3). “Poor” BRIX category lobsters (BRIX<6) were rare throughout with sample with percentages below 3% in all samples. Average BRIX level values for samples in 2023 (9.97 mg/mL) exceeded values for 2020 through 2022 (9.0) in Yarmouth Outside.

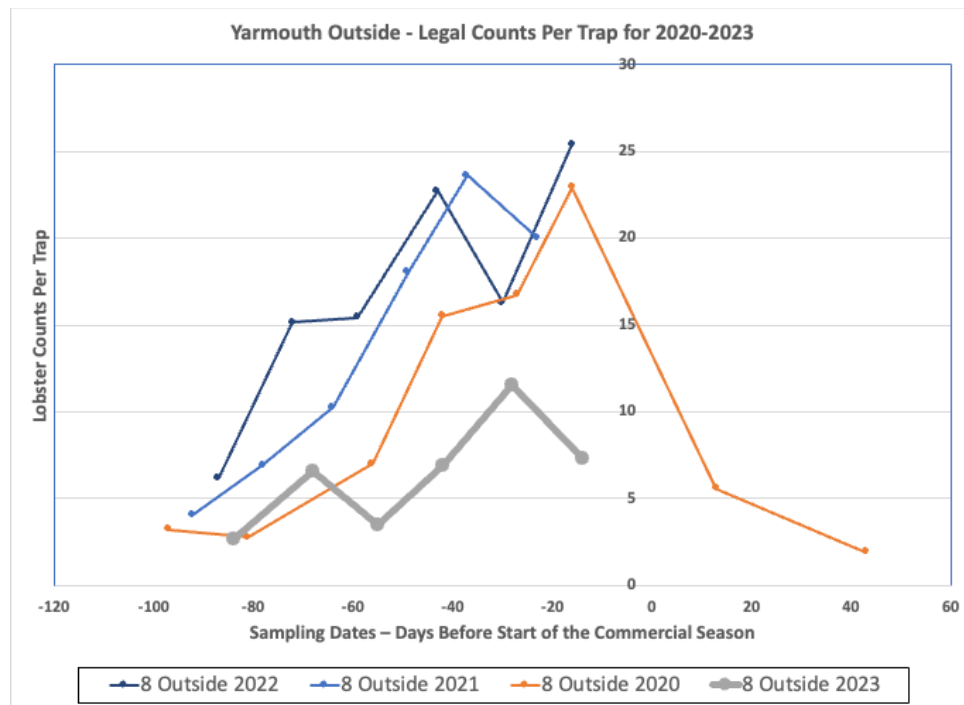
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are variable across the series from 2012 to 2023 for Yarmouth Outside. The average BRIX for the 2023 sample of October 30 is the third largest in the series and its BRIX categories are directly comparable to 2013. There is a negligible proportion of “Poor” quality lobster (BRIX<6) in the 2023 sample of October 30. As noted above, 2013 is the final year of the higher BRIX regime (2006-2013) after which overall BRIX levels across the 8 locations remain in a lower BRIX regime (since 2014).



(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 are compared to past years' samples (2020-2022). The 2023 counts for Yarmouth Outside (thick grey line) are considerably lower than the past years' counts by more than 50% for comparable sample date timing. As for the Yarmouth Inside counts per trap, the time series of counts per trap over the preseason in Yarmouth Outside exhibit a rise from the September samples until end October when counts per trap begin the characteristic decline at the end of the sampling period (mid-November). As evidenced again by the 2020 in-season sampling in the figure below, commercial catch rates are expected to fall off even more at the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 Yarmouth Outside samples were well below 2022-2021 values averaging 9.54% per sample versus 16-18% (in 2022 and 2021, respectively). The average weaks percentage for 2023 is slightly above the 2020 weaks percent of 8.34%. In 2023, the average percentage of Soft and Medium lobsters per sample (23%) fell compared to 2022 (29%) but were twice that of 2021 (11%) and still 7 times higher than the 2020 weaks percentage of 3.6%.

YARMOUTH OUTSIDE – Summary

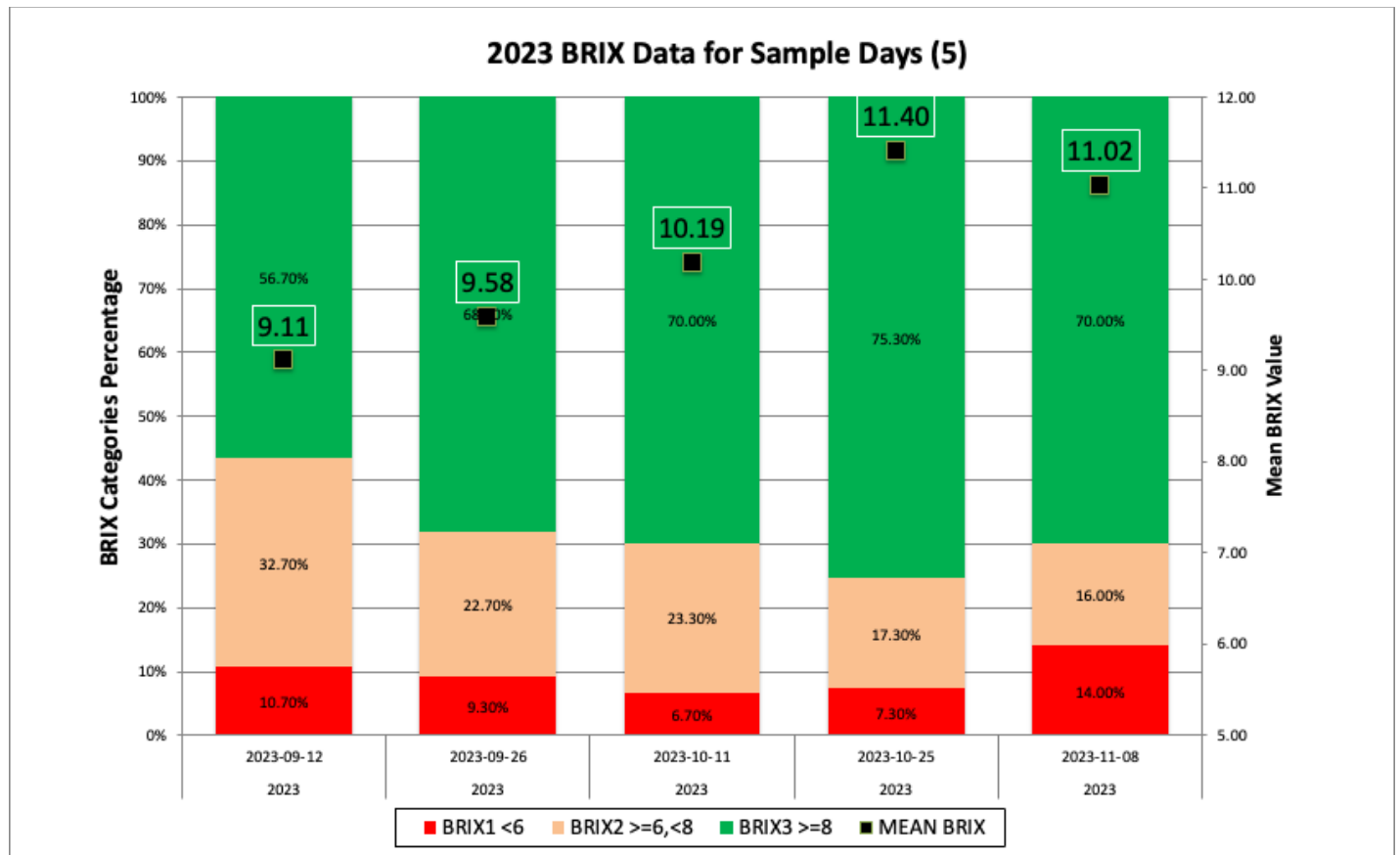
- 1) Yarmouth Outside shows a constant average BRIX between values of approximately 9.8 mg/mL with percentage of “Good” category lobsters (BRIX≥8) varying between 64% (November 13) and 80% (October 3).***
 - 2) Yarmouth Outside Lobster Quality Category for 2023 samples are classified as “Moderate” (M). It is expected that relatively high BRIX will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is directly to the 2013 sample, a period of good quality lobster in the commercial fisheries.***
 - 3) Yarmouth Outside sampling counts are considerably lower than past years’ survey catch counts by approximately -50% per sample. It is anticipated that Yarmouth Outside initial commercial catch rates will be similarly reduced compared to recent years.***
 - 4) Yarmouth Outside Weaks (9%) and Soft and Medium (23%) lobsters percentages were below the comparable 2022 levels but higher than the 2021 and 2020 percentage values.***
-

LOBSTER BAY INSIDE

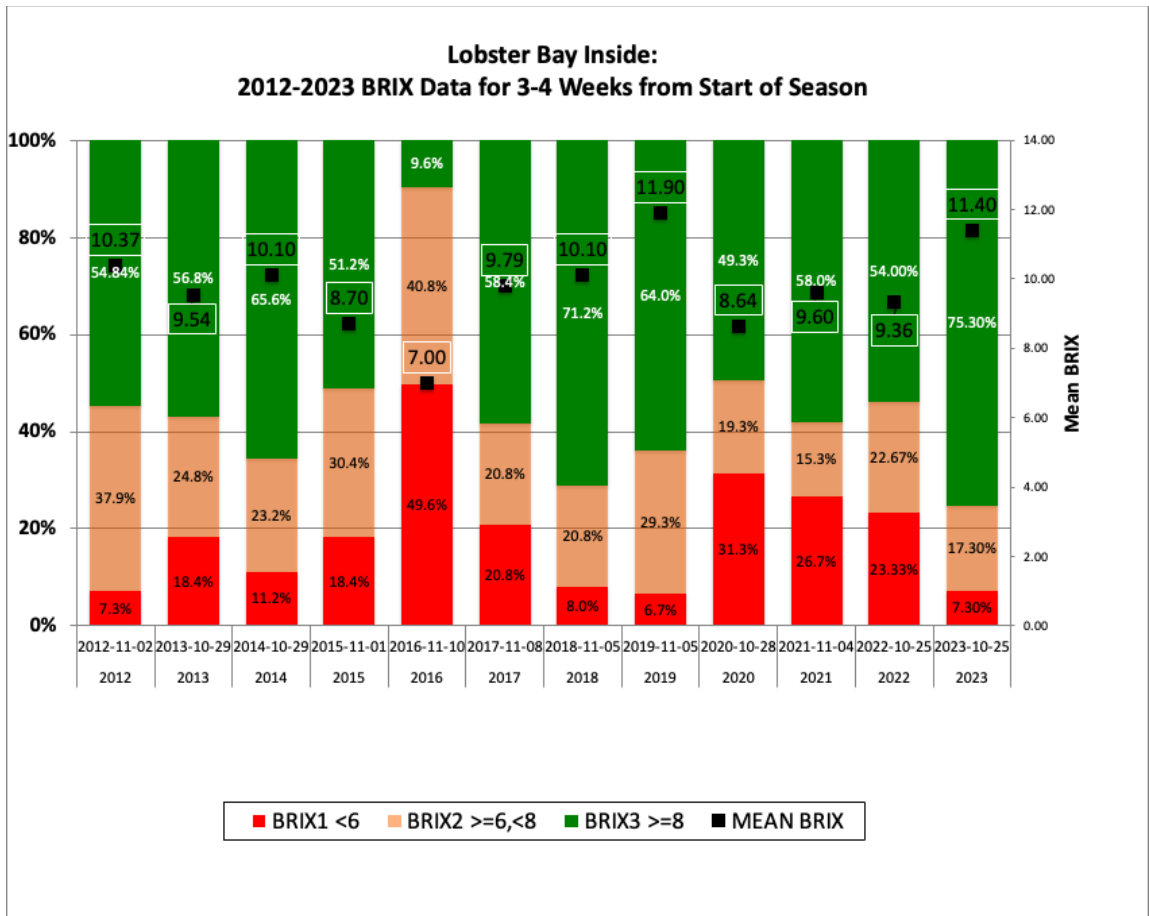
2023 SUMMARY OF RESULTS

(A) Blood Protein (BRIX) Categories–2023 Samples

In the figure below, 2023 preseason survey results for 5 sample sites in Lobster Bay Inside show a rise in average BRIX from 9.11 mg/mL in early-September to 11.4 mg/mL by late-October. A slight decline in the preseason ending sample average BRIX (11.02) is observed in the November 8 sample. Approximately 70% of samples attained “Good” levels of BRIX (≥ 8 mg/mL).



The proportion of “Poor” lobsters (BRIX<6 mg/mL) sampled in Lobster Bay Inside in 2023 averaged just below 10% across all 5 samples with the largest in the final preseason sample of November 8 (14%). Average BRIX level values for samples in 2023 (10.3 mg/mL) were similar to above average BRIX values for 2022 (10), 2021 (8.9) and 2020 (9.6).



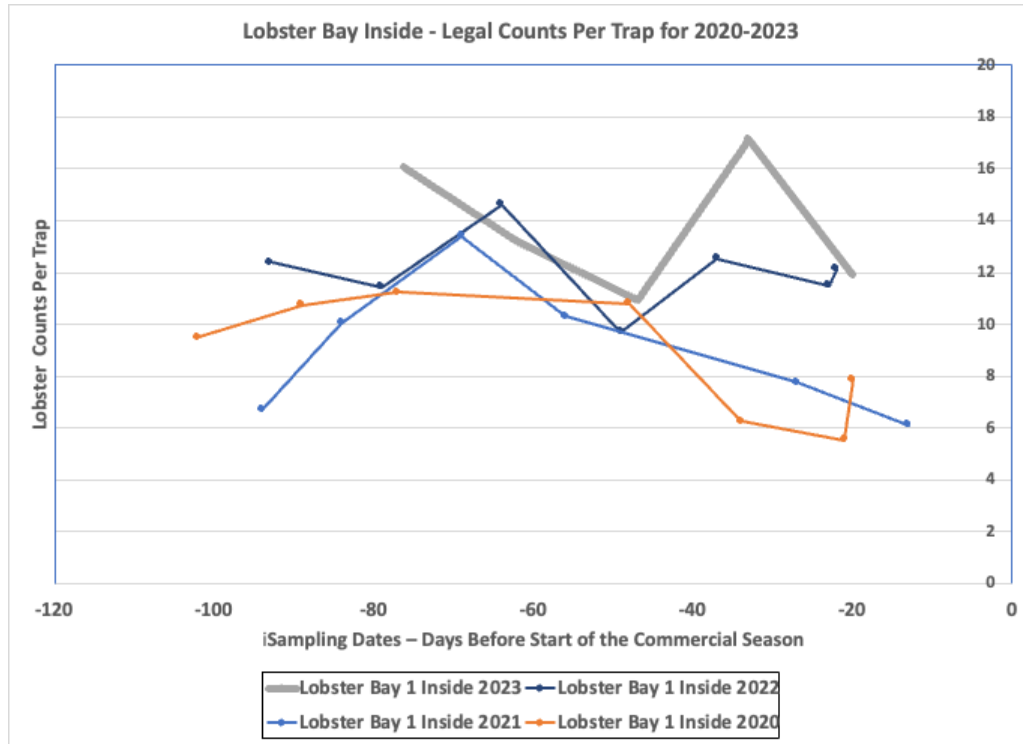
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure above, annual samples 3-4 weeks from the start of each commercial harvest season opening are somewhat variable across the series from 2012 to 2023 for Lobster Bay Inside. The 2023 sample (October 25) has the second highest BRIX average (11.4 mg/mL) in the series behind the 2019 average BRIX of 11.9 mg/mL. The October 25, 2023 sample is directly comparable to the November 5, 2018 sample but with an elevated average BRIX value (11.4 versus 10.1 mg/mL).

(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years’ samples (2020-2022). The counts for Lobster Bay Inside sampling are generally highest among the 4 Inside locations surveyed in LFAs33 and 34. In 2023, Lobster Bay Inside counts are slightly higher by comparison to past years’ counts at similar sampling dates. For Lobster Bay Inside, the time series of counts per trap over the preseason remain relatively stable from September through November with average counts varying between 8 and 14 lobsters per trap. The highest counts per trap (17 lobsters per trap) in the October 25 sample are predominantly males and appear to represent a change from the pattern of decline in past years after the early October samples. The evidence from the figure below is that commercial catch rates are expected to

fall precipitously in Lobster Bay Inside after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 Lobster Bay Inside samples were slightly below past years (2021-2022) values averaging 16.5% per sample versus 21% in 2022. The percent of weak lobsters in Lobster Bay Inside in 2020 (9.8%) was almost half of the 2023 value. The average percentage of Soft and Medium lobsters per sample in Lobster Bay Inside (21.6%) is comparable to the 2022 value (20.6%) but were twice that of the 2021 value (10.4%).

LOBSTER BAY INSIDE– Summary

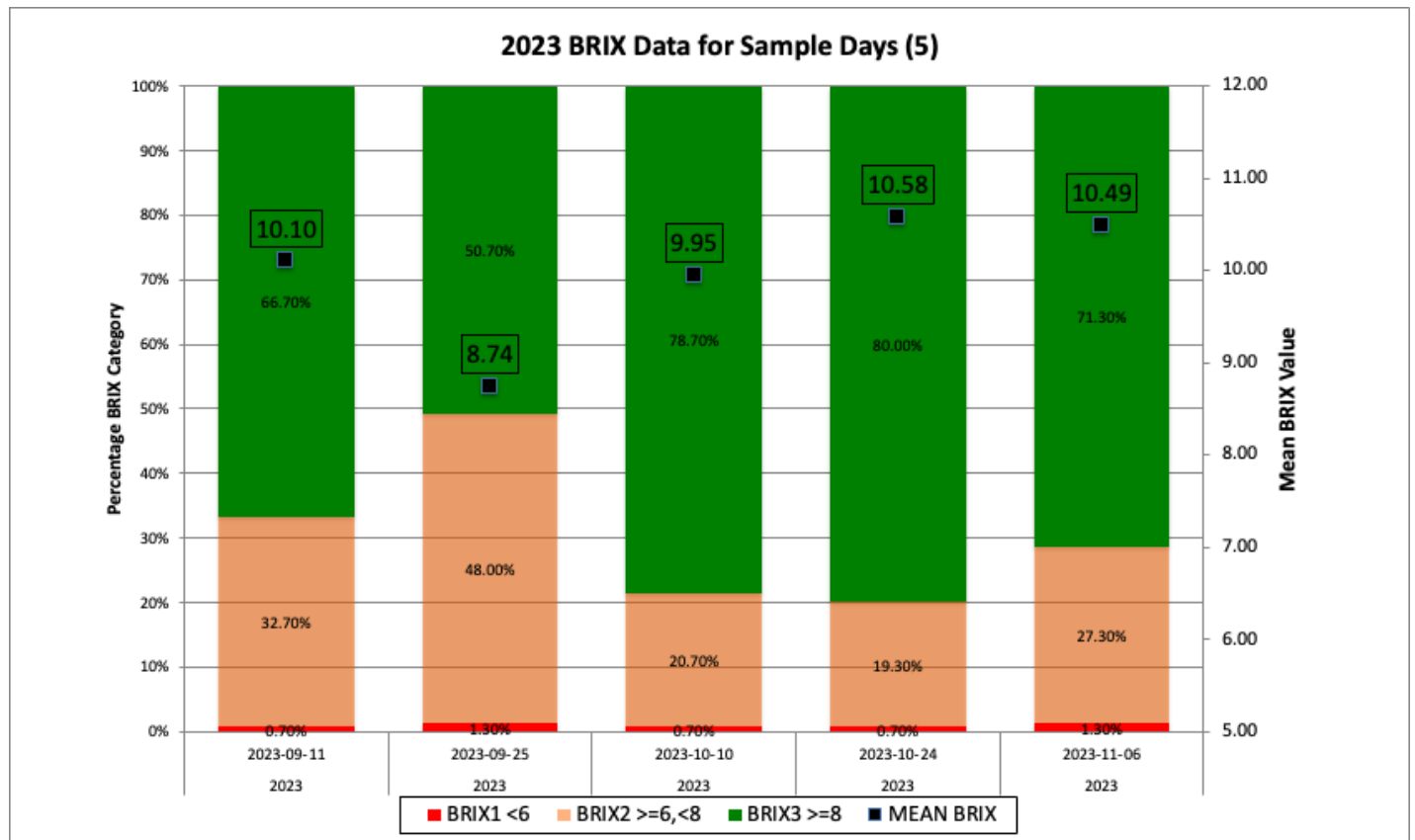
- 1) Lobster Bay Inside shows a rise in average BRIX from early-September to late-October with a slight decline in the preseason ending sample average BRIX (11.02). Approximately 70% of samples attained “Good” levels of BRIX (≥ 8 mg/mL).***
 - 2) Lobster Bay Inside Lobster Quality Category for 2023 samples are classified as “Moderate-Low” (ML). It is expected BRIX levels will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is most comparable to 2018 period.***
 - 3) Lobster Bay Inside sampling counts are slightly higher when compared to past years’ survey catch counts. It is anticipated that Lobster Bay Inside initial commercial catch rates will be similar to recent years.***
 - 4) Lobster Bay Inside Weak (16.5%) and Soft and Medium (21.6%) lobsters percentages were similar to 2022 levels but higher than the 2021 and 2020 percentage values.***
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LOBSTER BAY OUTSIDE

2023 SUMMARY OF RESULTS

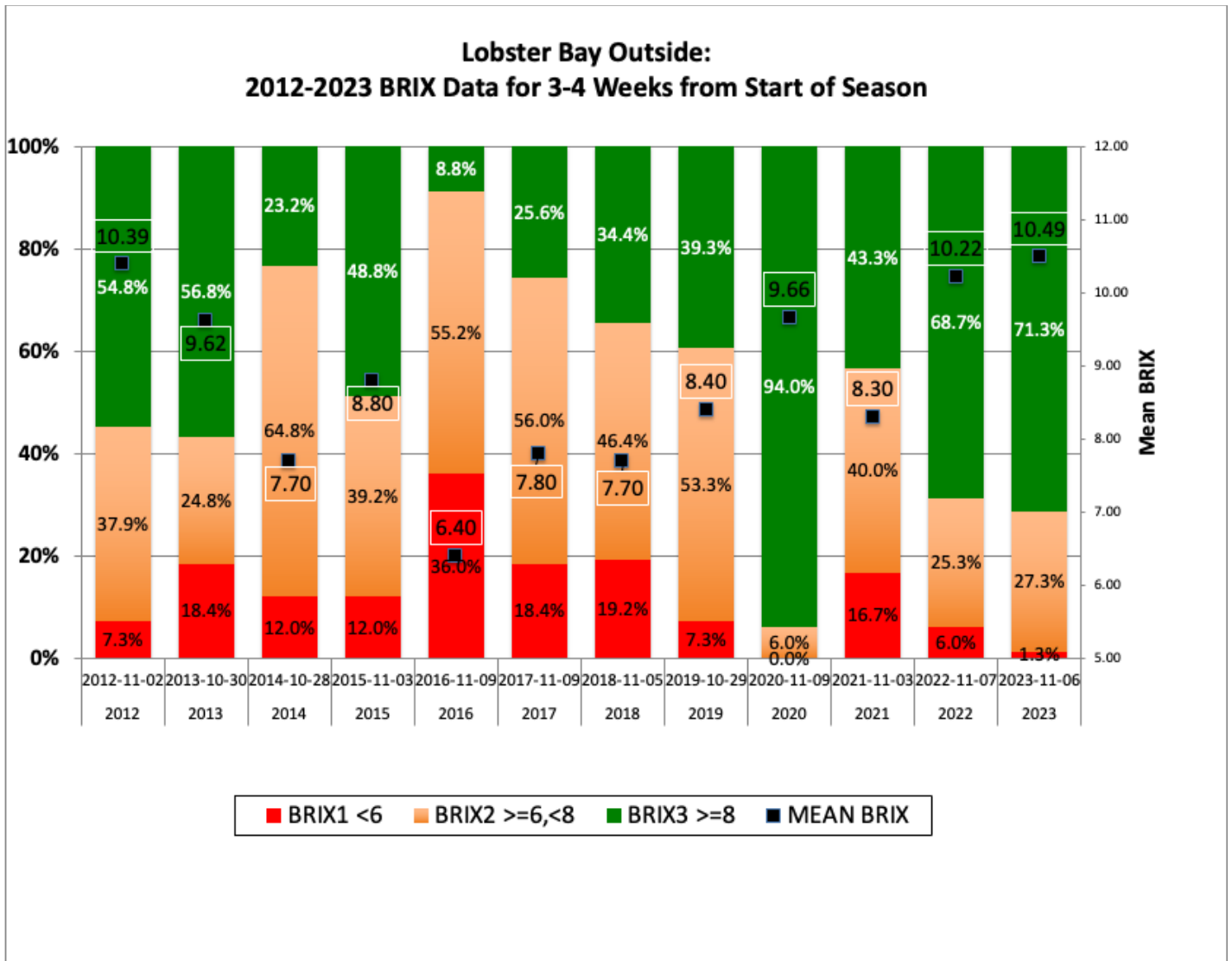
(A) Blood Protein (BRIX) Categories–2023 Samples

In the figure below, 2023 preseason survey results for 5 sample sites in Lobster Bay Outside show a constant average BRIX varying from 10.1 mg/mL in early-September to 10.5 mg/mL by early November. The sole exception is lower average BRIX (8.74) of the September 25 sample. Approximately 70% of samples attained “Good” levels of BRIX (≥ 8 mg/mL) and incidences of “Poor” lobsters in samples were very low – less than 2% in all samples.



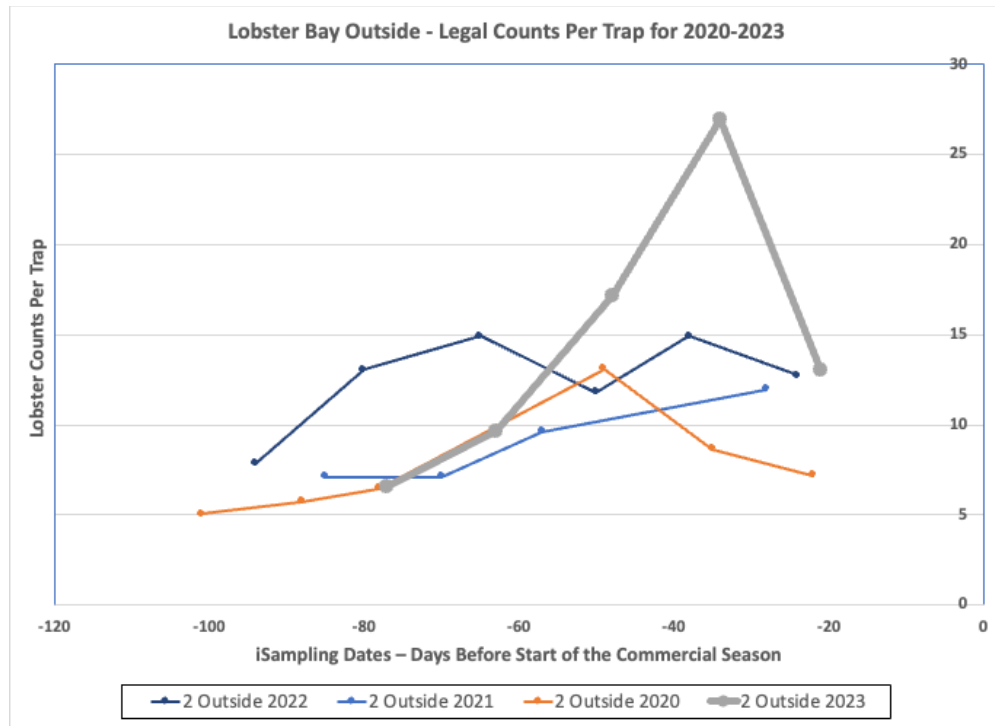
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are variable across the series from 2012 to 2023 for Lobster Bay Outside. The 2023 sample (November 6) has the highest BRIX average (10.49 mg/mL) in the series. The November 6, 2023 sample is comparable to the November 7, 2022 sample with similar average BRIX value and like BRIX category levels.



(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years' samples (2020-2022). The counts per trap for Lobster Bay Outside sampling are generally highest among the 4 Outside area locations in LFAs33 and 34. In 2023, Lobster Bay Outside counts are comparable to past years' counts at similar sampling dates with the exception of the spike in counts for the October 24 sample. The highest counts per trap (27 lobsters per trap) in the October 24 sample are equally males and females. The evidence from the figure below is that Lobster Bay Outside counts per trap return to level (approximately 13 lobsters per trap) at the November 6 sample. Commercial catch rates are expected to fall precipitously in Lobster Bay Outside after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 Lobster Bay Outside samples (13%) are similar to 2022 and 2021 values (13% and 18% respectively). The percent of weak lobsters in Lobster Bay Outside in 2020 was only 10%. The average percentage of Soft and Medium lobsters per sample in Lobster Bay Outside (21.2%) is identical to the 2022 value (21.4%) but considerably more than the 2021 and 2020 percent soft and weak values in Lobster Bay Outside (3.8% and 4.6% respectively).

LOBSTER BAY OUTSIDE– Summary

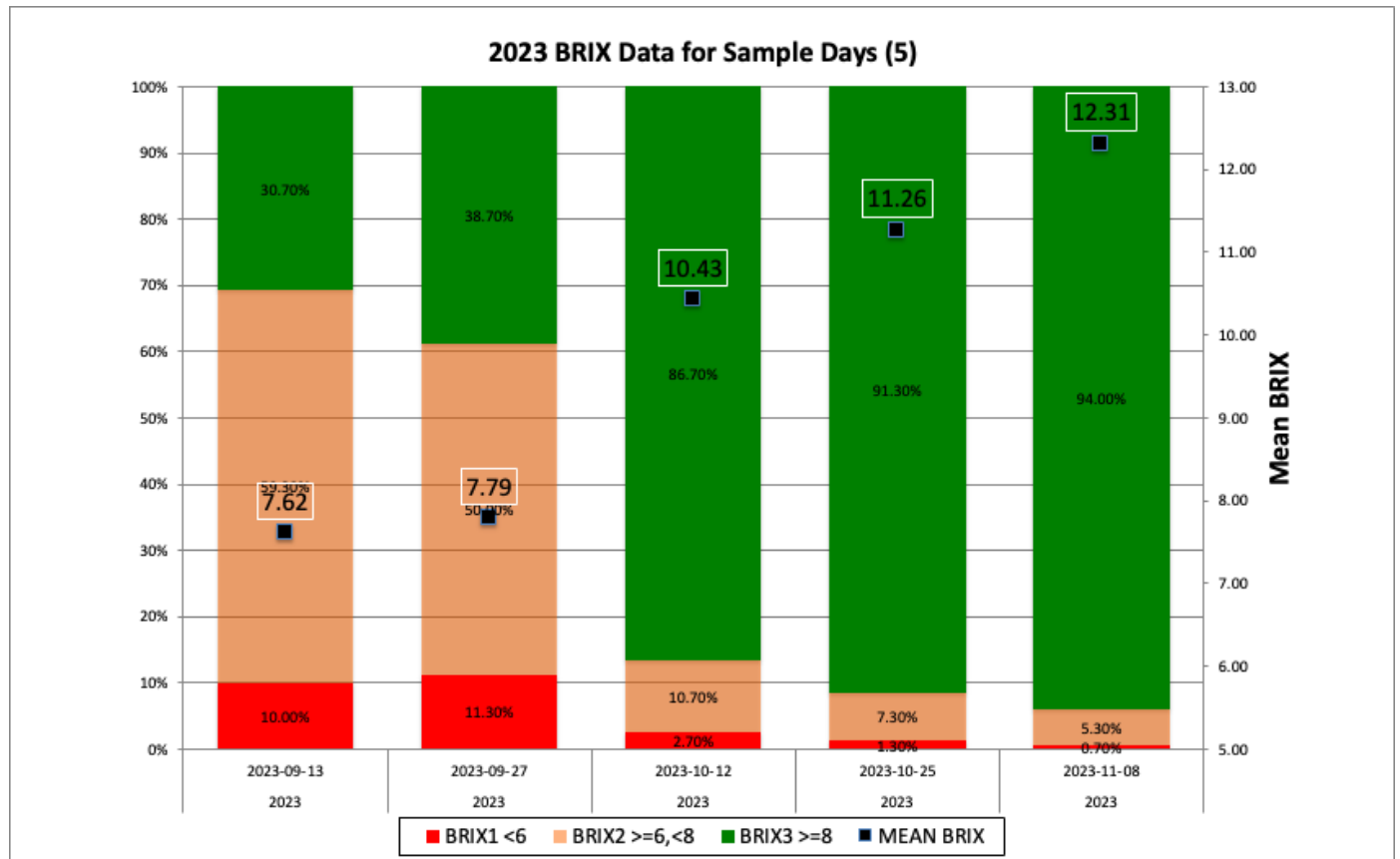
- 1) Lobster Bay Outside shows a constant average BRIX over the sampling period varying between 10.1 and 10.5 mg/mL with the exception of the lower BRIX of the September 25 sample. Approximately 70% of samples attained “Good” levels of BRIX (≥ 8 mg/mL) and incidences of “Poor” lobsters in samples were very low – less than 2% in all samples.***
- 2) Lobster Bay Outside Lobster Quality Category for 2023 samples are classified as “Moderate-Low” (ML). It is expected that BRIX levels will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is most comparable to last year’s 2022 sample.***
- 3) Lobster Bay Outside counts are comparable to past years’ counts at similar sampling dates with the exception of the spike in counts for the October 24 sample. It is anticipated that Lobster Bay Inside initial commercial catch rates will be similar to recent years.***
- 4) Lobster Bay Inside Weak (13%) and Soft and Medium (21.2%) lobsters percentages were identical to their comparable 2022 levels but considerably higher than 2021 and 2020 percentages.***

PORT LA TOUR INSIDE

2023 SUMMARY OF RESULTS

(A) Blood Protein (BRIX) Categories–2023 Samples

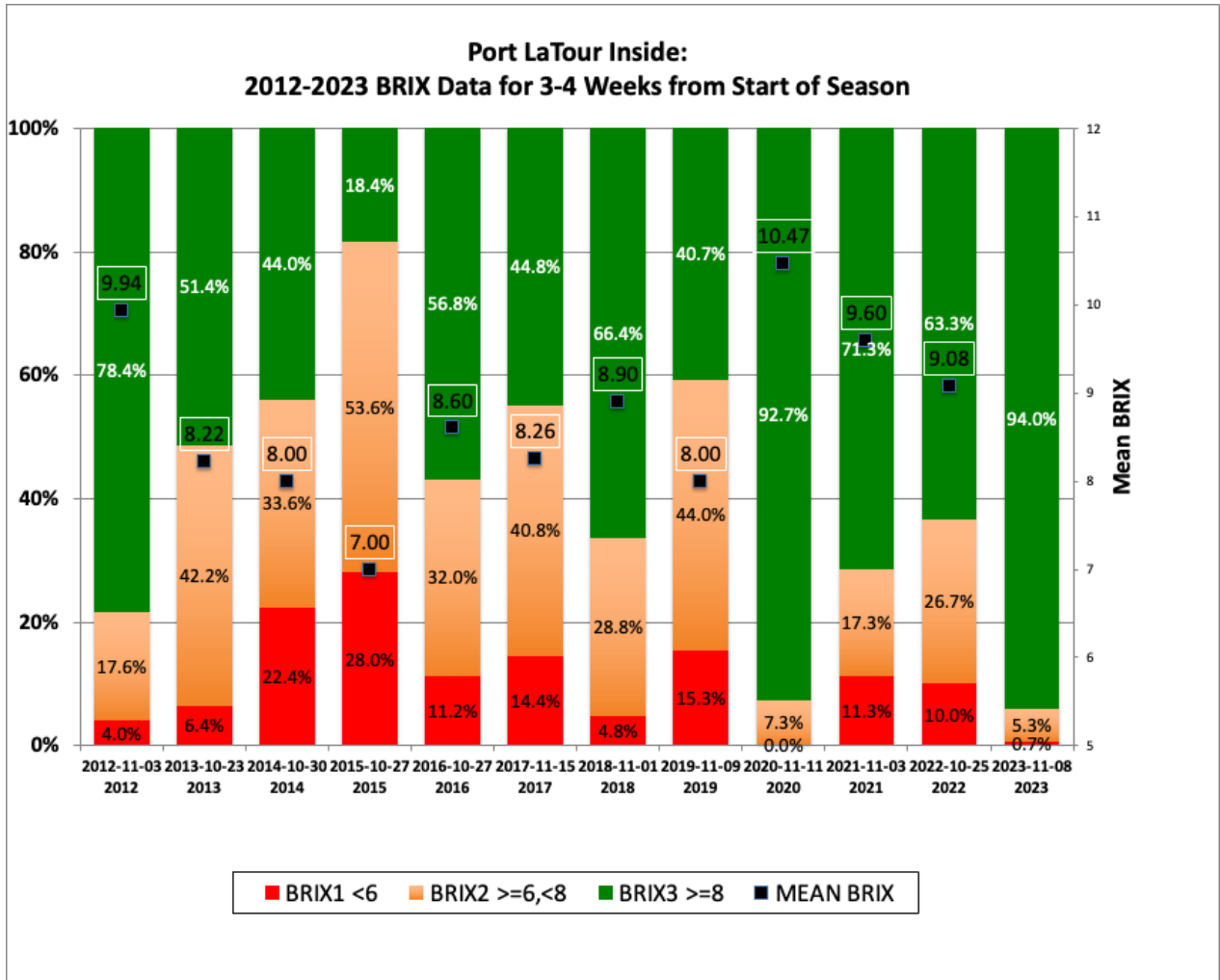
In the figure below, 2023 preseason survey results for 5 sample sites in Port La Tour Inside show a rise in average BRIX from early-September (7.62 mg/mL) to the high of early-November samples (12.31 mg/mL). After September, 85% or more of each sample attained “Good” levels of BRIX (≥ 8 mg/mL).



Similarly, the proportion of “Poor” lobsters (BRIX<6 mg/mL) sampled in Port La Tour Inside after September falls below 3% for all subsequent samples in 2023. Average BRIX level values for samples in 2023 (9.9 mg/mL) were the highest among 2020-2023 calculated values.

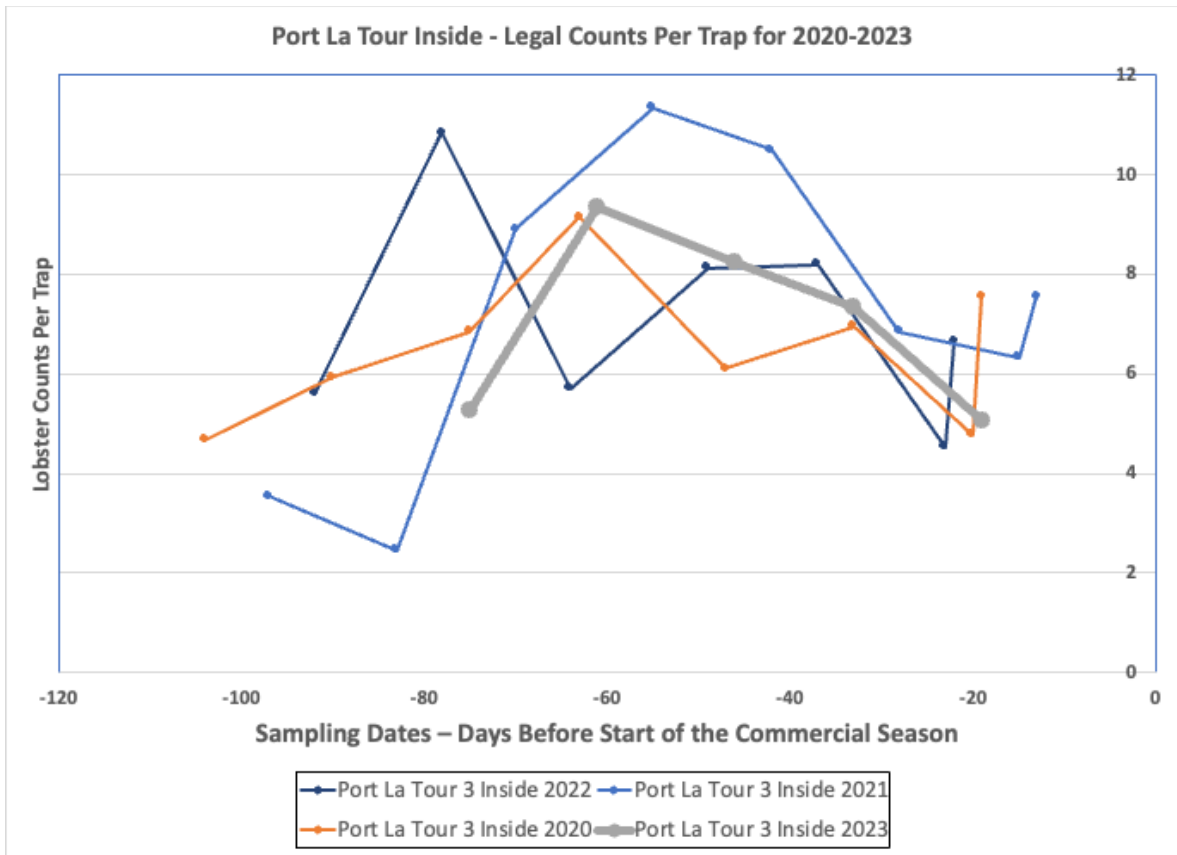
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are variable across the series from 2012 to 2023 for Port La Tour Inside. The 2023 sample (November 8) has the highest BRIX average (12.31 mg/mL – off scale; see also the figure above) in the series. The November 8, 2023 sample is directly comparable to the November 11, 2020 sample but with an elevated average BRIX value (12.31 versus 10.47 mg/mL).



(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years' samples (2020-2022) for Port La Tour Inside. In 2023, Port La Tour Inside counts are directly comparable to past years' counts at similar sampling dates. The time series of counts over the preseason in Port La Tour Inside exhibit an initial rise to end-September and then fall (by 50%) to the end of the sampling period (mid-November). As evidenced the figure below, commercial catch rates are expected to fall precipitously after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 Port La Tour Inside samples were below the 2022 values averaging 6.3% per sample versus 13.5% in 2022 and closer to the 2021 and 2020 weak percents (7.6% and 5.7% respectively). The average percentage of Soft and Medium lobsters per sample (17%) also fell compared to 2022 (27%) but were higher than the 2021 and 2020 percentage values of only 4%.

PORT LA TOUR INSIDE– Summary

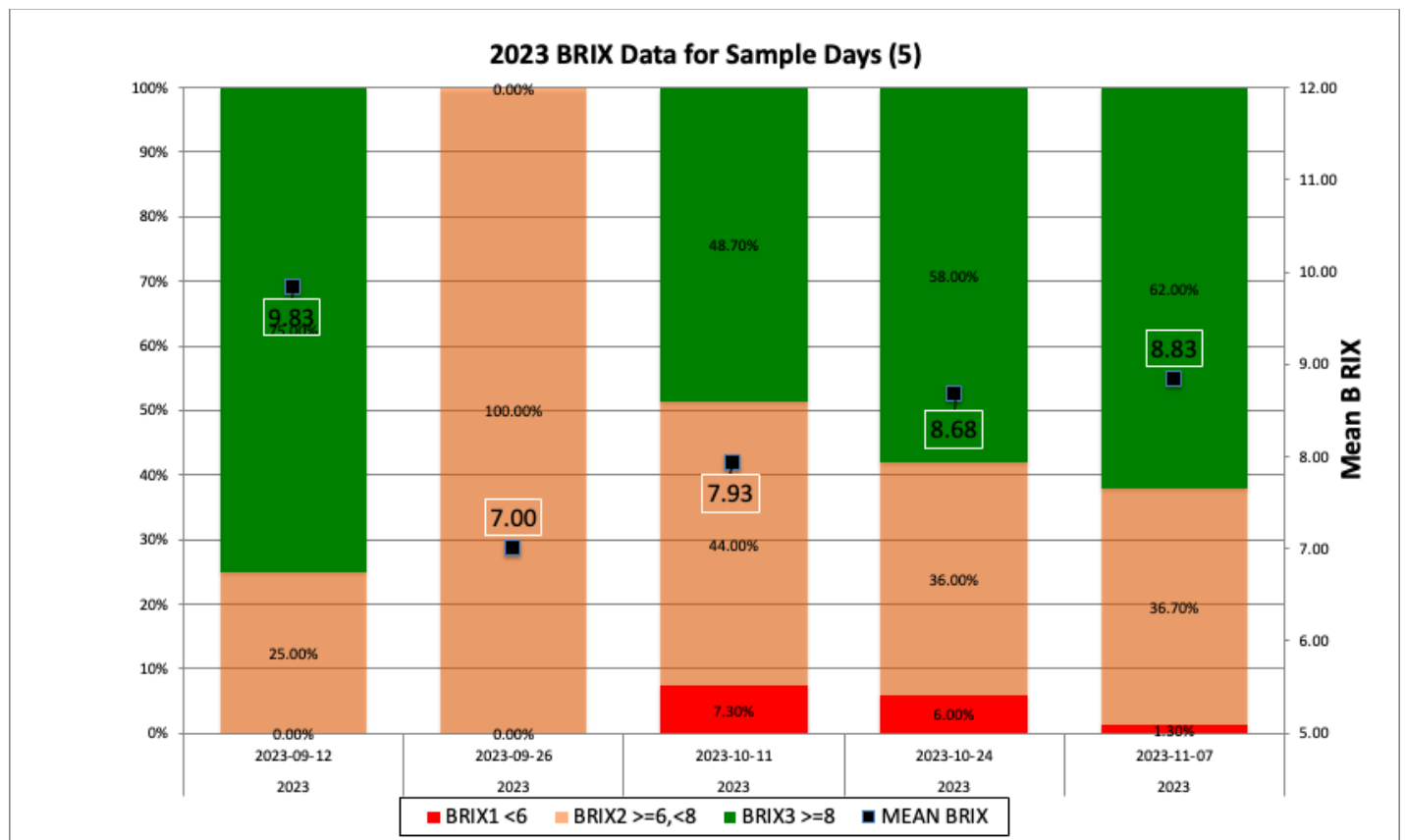
- 1) *Port La Tour Inside shows a rise in average BRIX from early-September (7.62 mg/mL) to the high of early-November samples (12.31 mg/mL). After September, 85% or more of each sample attained “Good” levels of BRIX (≥8 mg/mL).*
 - 2) *Port La Tour Inside Lobster Quality Category for 2023 samples are classified as “Moderate” (M). It is expected that relatively high BRIX will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is directly comparable to the 2020 sample but with an elevated average BRIX value.*
 - 3) *Port La Tour Inside sampling counts are directly comparable to past years’ survey catch counts. It is anticipated that Yarmouth Inside initial commercial catch rates will be similar to recent years.*
 - 4) *Port La Tour Inside Weak (6%) and Soft and Medium (17%) lobsters percentages were similar to 2022 levels but higher than the 2021 and 2020 percentage values.*
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PORT LA TOUR OUTSIDE

2023 SUMMARY OF RESULTS

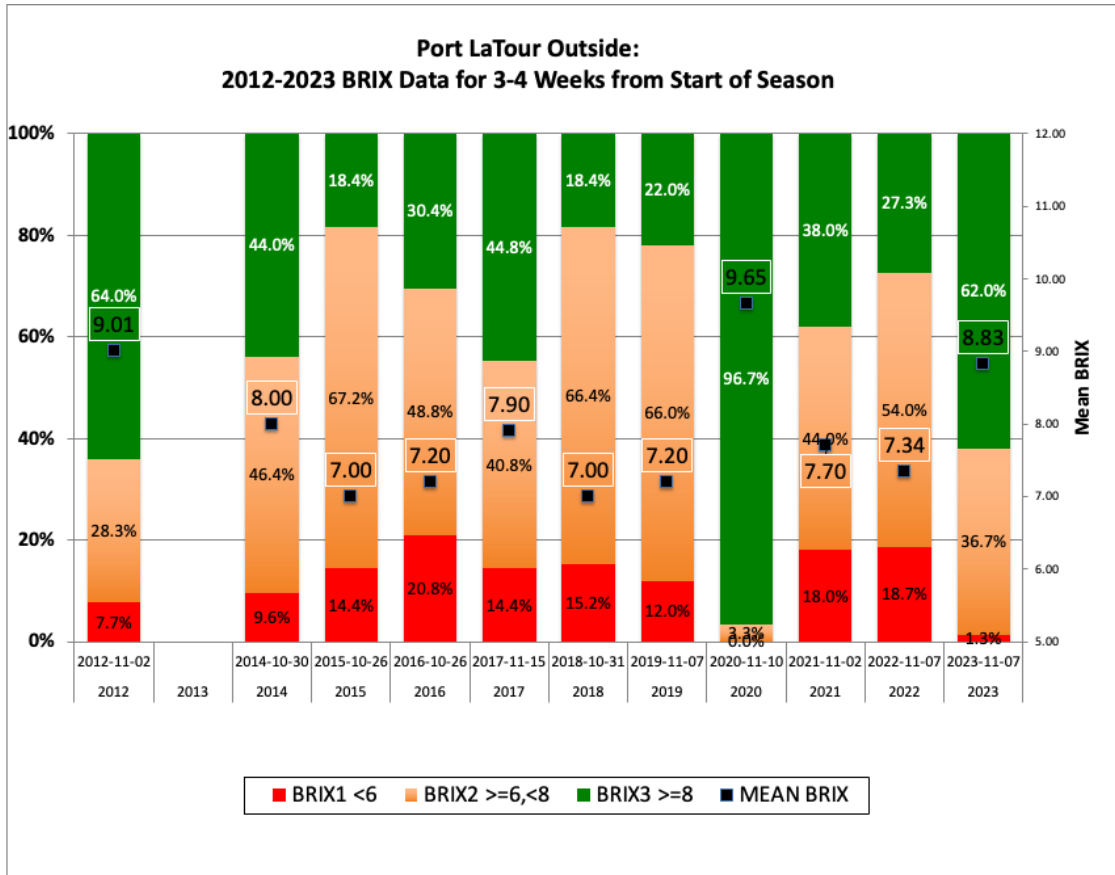
(A) Blood Protein (BRIX) Categories–2023 Samples

In the figure below, 2023 preseason survey results for 5 sample sites in Port La Tour Outside show a variable average BRIX ranging from a low of 7 mg/mL in late-September to a high of 9.83 mg/mL in late-September's first sample of the 2023 preseason period. Average BRIX values actually increase after the late-September sample low, climbing to an average BRIX of 8.83 mg/mL by the end of the sampling period (November 7). For Port La Tour Outside, the September samples contain very few sampled lobsters far below the protocol of 150 lobsters to sample. Thus, only 4 and 1 lobster were sampled respectively in the September samples in Port La Tour Outside due to the (historical) inability to catch in this location early in the survey. Ignoring the September samples in Port La Tour Outside in 2023, we note that the trend of the BRIX level categories is to grow the "Good" levels of BRIX (≥ 8 mg/mL) (from 48% to 62%) and decrease the incidences of "Poor" lobsters in samples to the end of the sampling period (from 7.3% to 1.3%).



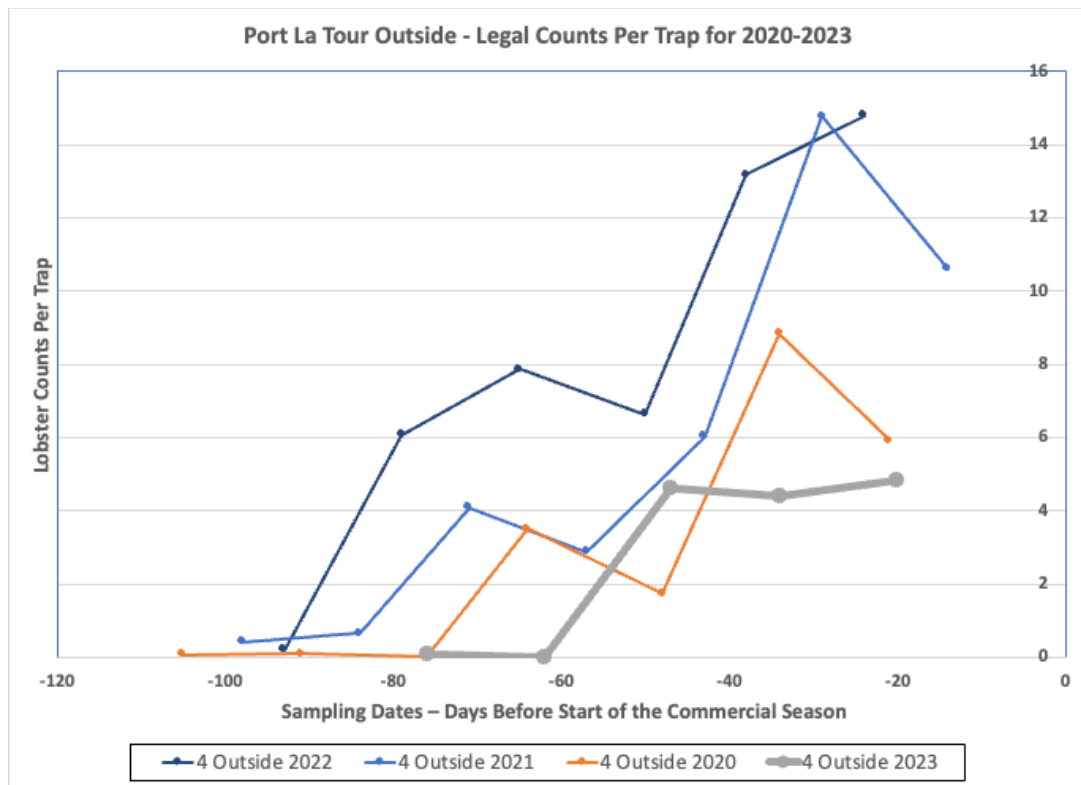
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are highly variable across the series from 2012 to 2023 for Port La Tour Outside. The 2023 sample (November 7) has the third highest BRIX average (8.83 mg/mL) in the series. The November 7, 2023 sample is comparable to the November 2, 2012 sample with similar average BRIX value (9 mg/mL) and like BRIX category levels.



(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years' samples (2020-2022) for Port La Tour Outside. In 2023, Port La Tour Outside counts are among the lowest in comparison to past years' counts at similar sampling dates. The time series of counts over the preseason in Port La Tour Outside exhibit a slow rise to mid-October and a leveling off at counts per trap that are approximately 50% below those of 2020-2022 to the end of the sampling period (mid-November). As evidenced the figure below, commercial catch rates are expected to fall precipitously after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 Port La Tour Inside samples were below the 2022 values averaging 15.2% per sample versus 23.4% in 2022. Percent weaks in 2021 and 2020 were 10% and 5% respectively. The average percentage of Soft and Medium lobsters per sample were high in Port La Tour Outside (50%) and similar to 2022 (44%). 2021 and 2020 percent values for soft and medium were both less than 17%.

PORT LA TOUR OUTSIDE– Summary

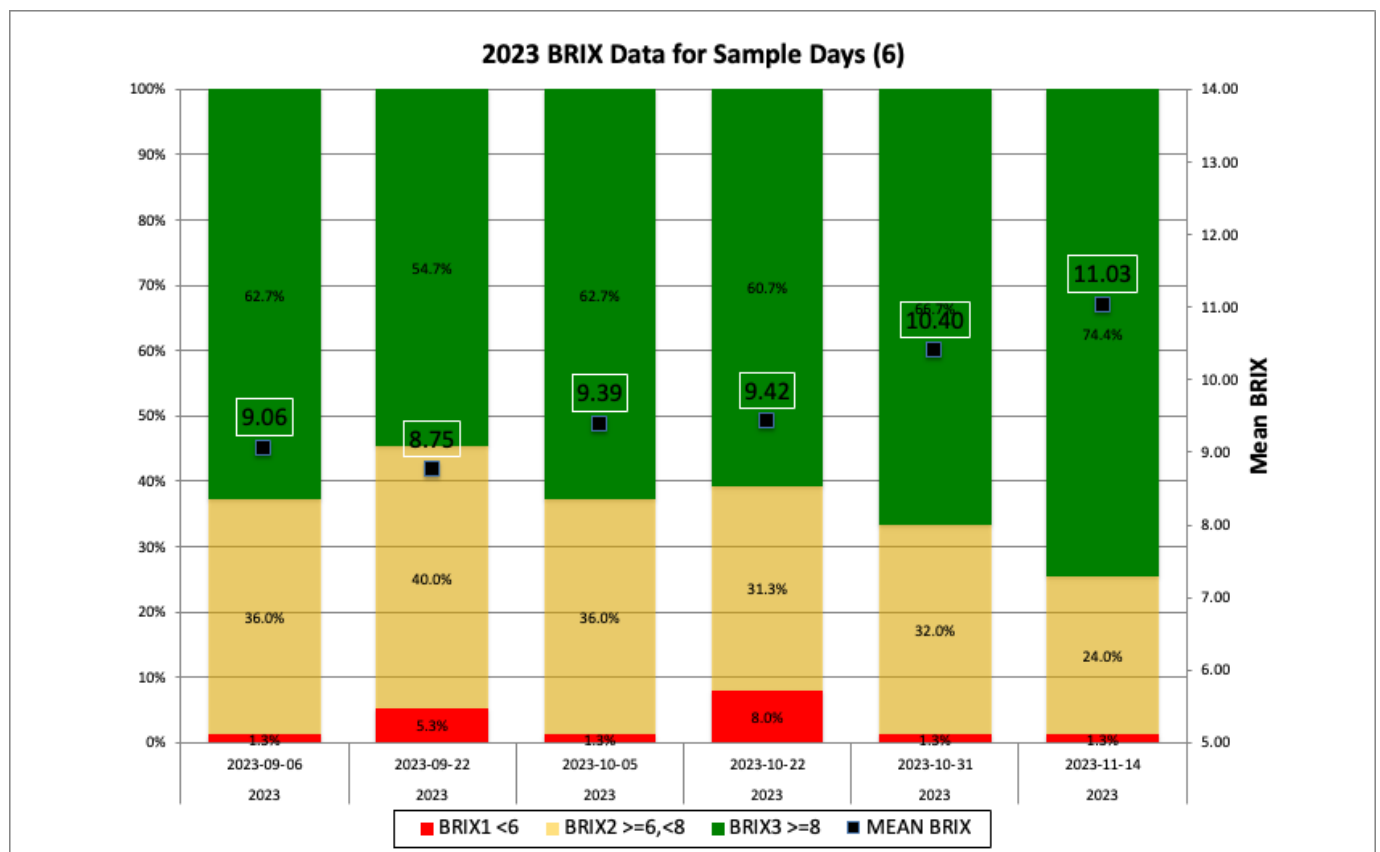
- 1) Port La Tour Outside average BRIX values increase after the late-September sample low, climbing to an average BRIX of 8.83 mg/mL by the end of the sampling period (November 7).***
 - 2) Port La Tour Outside Lobster Quality Category for 2023 samples are classified as “Moderate” (M). It is expected that moderate BRIX will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is comparable to the 2012 sample with similar average BRIX value (9 mg/mL) and like BRIX category levels.***
 - 3) Port La Tour Outside counts are among the lowest in the time series. Counts per trap are approximately 50% below those of 2020-2022 to the end of the sampling period. It is anticipated that Port La Tour Outside initial commercial catch rates will be lower than that of recent years.***
 - 4) Port La Tour Outside Weaks (15%) and Soft and Medium (50%) lobsters percentages were high relative to the 2022, 2021 and 2020 percentage values.***
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ST. MARY’S BAY INSIDE

2023 SUMMARY OF RESULTS

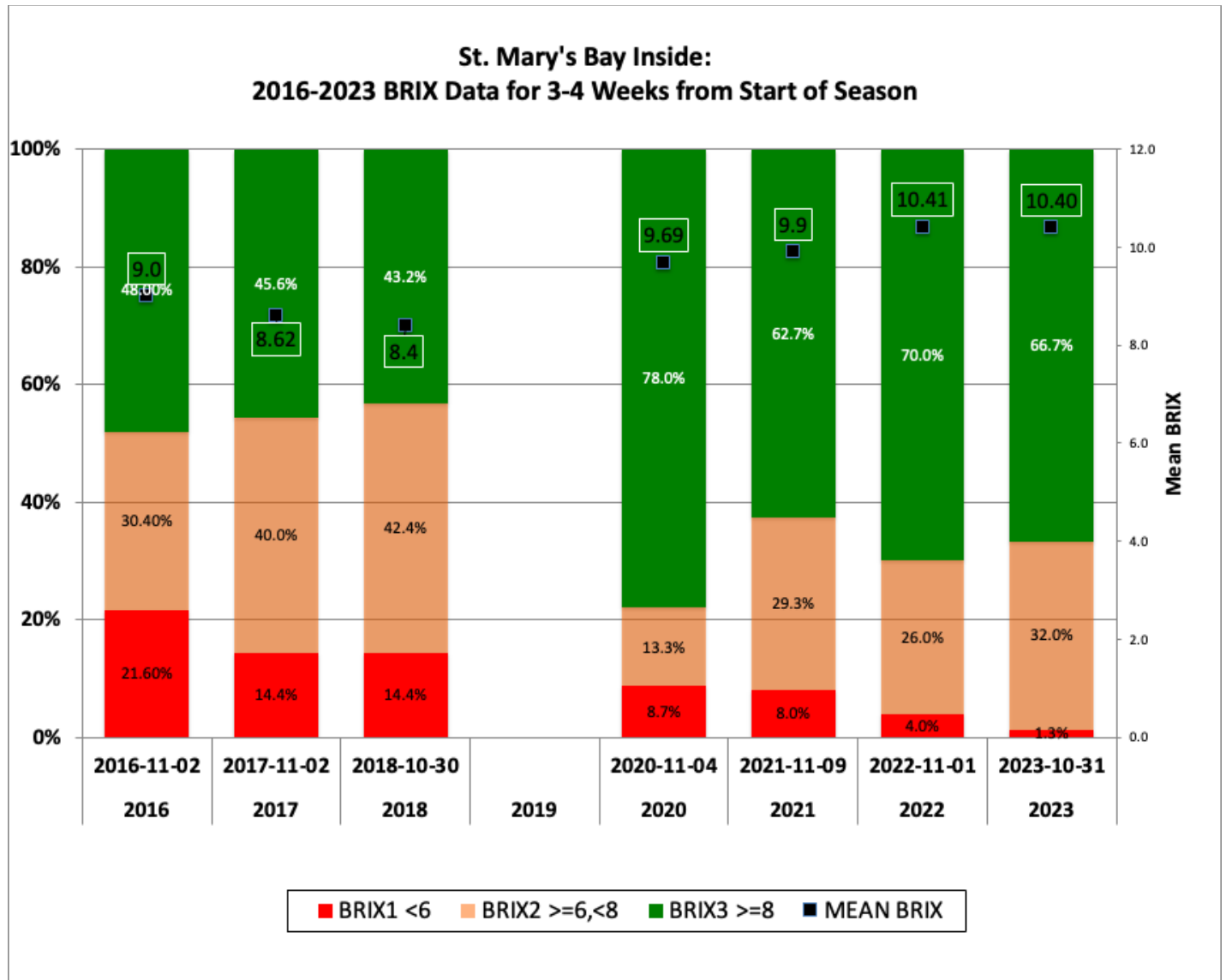
(A) Blood Protein (BRIX) Categories–2023 Samples

In the figure below, 2023 preseason survey results for 6 sample sites in St. Mary’s Bay Inside show a gradual rise in average BRIX from the September samples (9.06 and 8.75 mg/mL) to the mid-November sample (11.03 mg/mL). BRIX category levels remained relatively constant with samples attaining 60-75% “Good” levels for BRIX (≥ 8 mg/mL). The proportion of “Poor” lobsters (BRIX <6 mg/mL) sampled in St. Mary’s Bay Inside did not exceed 10% throughout the sampling period. Average BRIX level values for samples in 2023 (9.7 mg/mL) were comparable to 2022 values (9.95) and above values for 2021 (9.2) through 2020 (8.4).



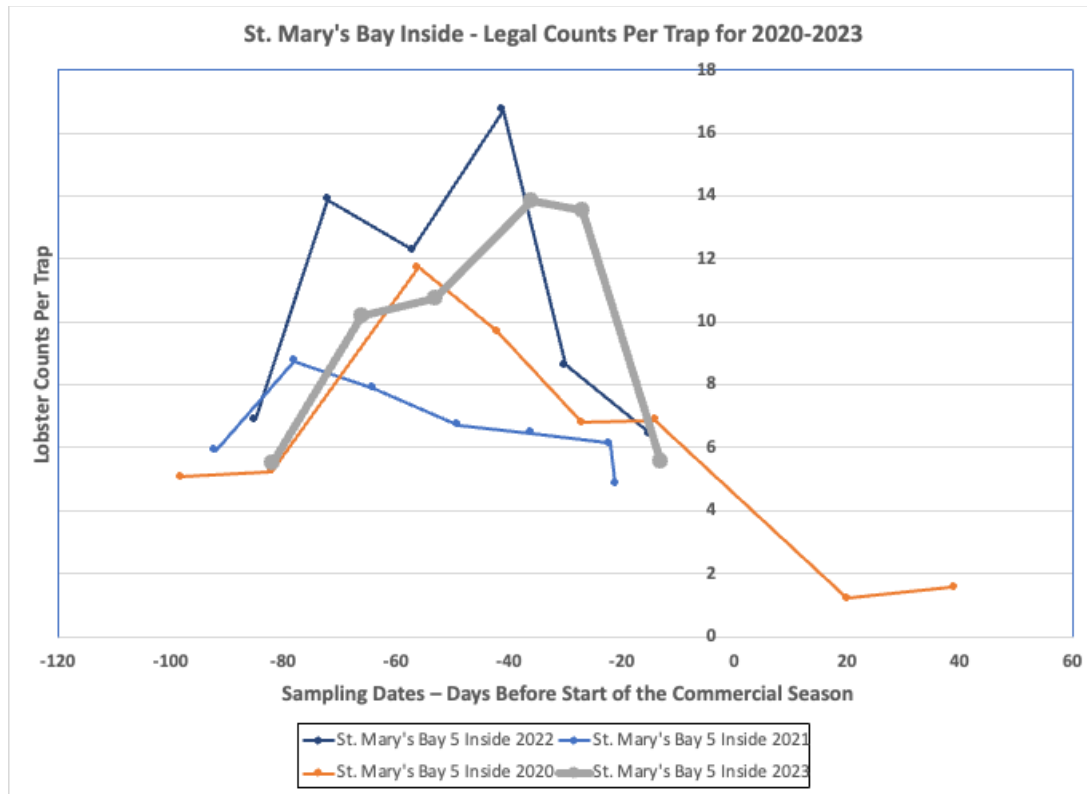
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are somewhat variable across the series from 2016 to 2023 for Yarmouth Inside. The 2023 sample (October 31) has the highest BRIX average (10.4 mg/mL) in the series (roughly equivalent to the average BRIX of the November 1, 2022 sample at 10.41). The October 31, 2023 sample is also directly comparable to the November 1, 2022 sample.



(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years' samples (2020-2022). The counts for St. Mary's Bay Inside are comparable to past years' counts. The characteristic time series of counts over the preseason in St. Mary's Bay Inside exhibit a rise toward end-October and then a fall (by 50+%) to the end of the sampling period (mid-November). As evidenced by the 2020 in-season sampling in the figure below, commercial catch rates are expected to fall precipitously after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 St. Mary's Bay Inside samples (13.3%) were comparable to 2022 values (11.4%) but greater than the past years (2020-2021) values for weak percent in samples of 6% and 4% respectively. The average percentage of Soft and Medium lobsters per sample (22%) fell slightly compared to 2022 (23%) but were well above the almost negligible 2021 (5%) and 2020 (1%) percents for soft and medium lobsters in the samples.

ST. MARY'S BAY INSIDE– Summary

1) St. Mary's Bay Inside shows a gradual rise in average BRIX from September to the mid-November sample. "Good" BRIX category levels remained relatively constant around 65% while the proportion of "Poor" lobsters sampled in St. Mary's Bay Inside did not exceed 10% throughout. Average BRIX level values in 2023 (9.7 mg/mL) were comparable to 2022 (9.95) and above values for 2021-2020.

2) St. Mary's Bay Inside Lobster Quality Category for 2023 samples are classified as "Moderate" (M). It is expected that average BRIX levels will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is directly comparable to the 2022 sample.

3) St. Mary's Bay Inside sampling counts are comparable to past years' survey catch counts. It is anticipated that St. Mary's Bay Inside initial commercial catch rates will be similar to recent years.

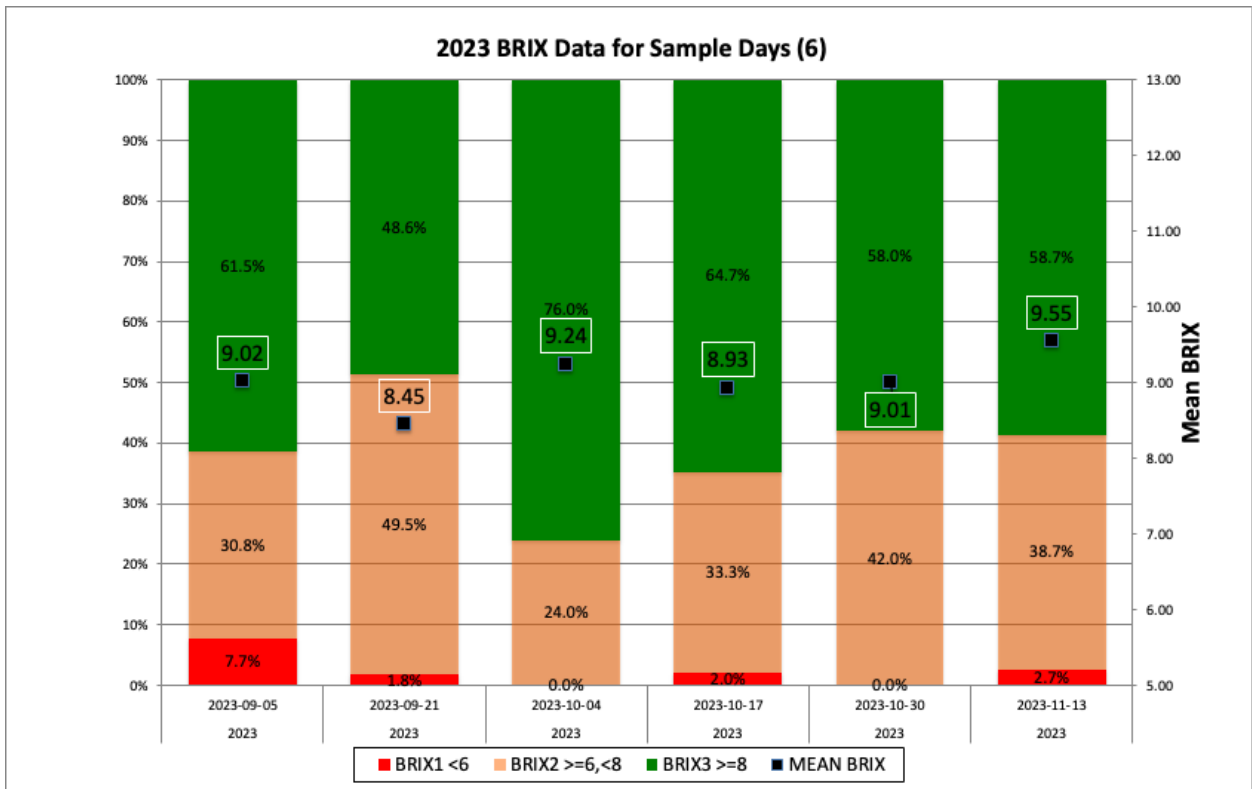
4) St. Mary's Bay Inside Weak (13%) and Soft and Medium (22%) percentages were similar to 2022 levels but higher than the 2021 and 2020 percentage values.

ST. MARY’S BAY OUTSIDE

2023 SUMMARY OF RESULTS

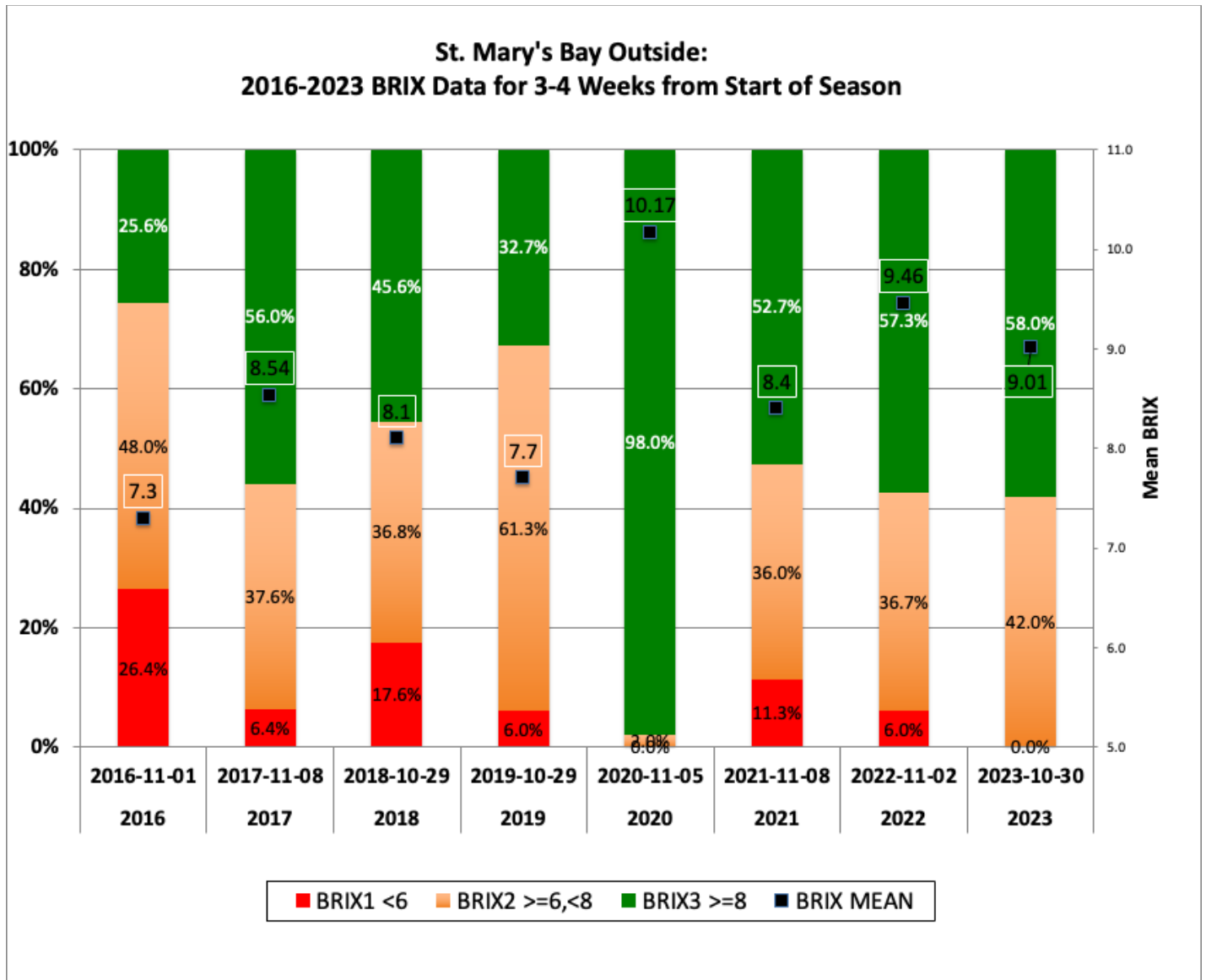
(A) Blood Protein (BRIX) Categories–2023 Samples

In the figure below, 2023 preseason survey results for 6 sample sites in St. Mary’s Bay Outside show a relatively constant average BRIX ranging from a low of 8.45 mg/mL (September 21 sample) to the high of 9.55 mg/mL at the ending mid-November sample. BRIX category levels also remained relatively constant with samples attaining 49-76% “Good” levels for BRIX (≥ 8 mg/mL) throughout the sampling period. The proportion of “Poor” lobsters (BRIX < 6 mg/mL) sampled in St. Mary’s Bay Outside did not exceed 8% for all samples. Average BRIX level values for samples in 2023 (9.1 mg/mL) were comparable to 2022 values (9.21) and above values for 2021 (8.4) through 2020 (8.65).



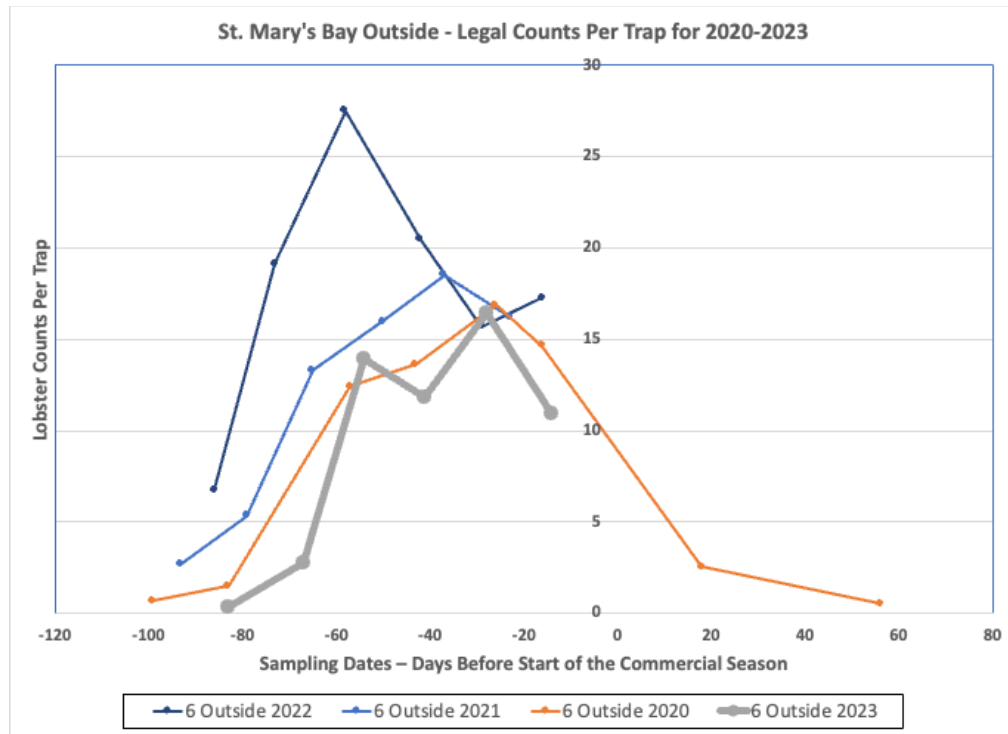
(B) Blood Protein (BRIX) Categories – Annual Samples 3-4 weeks before season start

From the figure below, annual samples 3-4 weeks from the start of each commercial harvest season opening are somewhat variable across the series from 2016 to 2023 for St. Mary’s Bay Outside. The 2023 sample (October 30) has the third highest BRIX average (9.01 mg/mL) in the series. The October 30, 2023 sample is also directly comparable to the November 2, 2022 sample with similar BRIX category levels but elevated average BRIX (9.46 mg/mL) in the 2022 sample.



(C) Counts (legal-sized) per trap for 2023 samples

In the figure below, the counts per trap of lobsters (male and female) of legal-sized (82.5 mm or greater) that occurred in the survey samples dates in 2023 (thick grey line) are compared to past years' samples (2020-2022). The counts for St. Mary's Bay Outside are, for the most part, lower than previous years' counts. The 2023 counts do exhibit the characteristic time series of counts over the preseason showing an initial rise toward end-October and then a fall to the end of the sampling period (mid-November). As evidenced by the 2020 in-season sampling for St. Mary's Bay Outside in the figure below, commercial catch rates are expected to fall precipitously after the beginning of the commercial season as legal sized lobster abundance is extracted.



Counts of weak lobsters in the 2023 St. Mary's Bay Outside samples (11.7%) were below 2022 values (17.3%) but greater than the past years (2020-2021) values for weak percent in samples of 9.5% and 3.7% respectively. The average percentage of Soft and Medium lobsters per sample (24.5%) rose slightly compared to 2022 (21.3%) but were well above the 2021 (8.2%) and 2020 (0.6%) percents for soft and medium lobsters in the samples.

ST. MARY'S BAY OUTSIDE– Summary

1) St. Mary's Bay Outside shows a constant average BRIX over the sampling period. "Good" levels for BRIX range between 49-76% while "Poor" lobsters did not exceed 8% for all samples. Average BRIX level values of 9.1 mg/mL were comparable to 2022 values and above 2021-2020 values.

2) St. Mary's Bay Outside Lobster Quality Category for 2023 samples are classified as "Moderate" (M). It is expected that favorable BRIX will be maintained into December 2023 as lobster move from post moult to premoult status over the winter. The 2023 sample is directly comparable to the recent 2022 sample.

3) St. Mary's Bay Outside counts are, for the most part, lower than previous years' counts. It is anticipated that St. Mary's Bay Outside initial commercial catch rates will be lower compared to recent years.

4) St. Mary's Bay Outside Weak (11%) were below 2022 values, and 2023 Soft and Medium (24.5%) percentages were above 2022 levels. The 2023 percentages were both well above the 2021 and 2020 percentage values.

Acknowledgements

Coldwater Lobster Association and Université Sainte-Anne wish to thank all participants in, and contributors to the 2023 Preseason Lobster Moulting & Quality Survey. Your commitment to this scientific task is commendable. We appreciate and thank all of you for your continued support and improvement of this important scientific study for the benefit of the lobster sector in southwest Nova Scotia. To those about to embark on another lobster season in LFAs 33 and 34, here's to calm waters, a prosperous season, and stable international and domestic markets. Stay safe and watch out for one another.





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