



2018 RECRUITMENT INDEX PROGRAM RESULTS

Gulf Nova Scotia Fleet Planning Board

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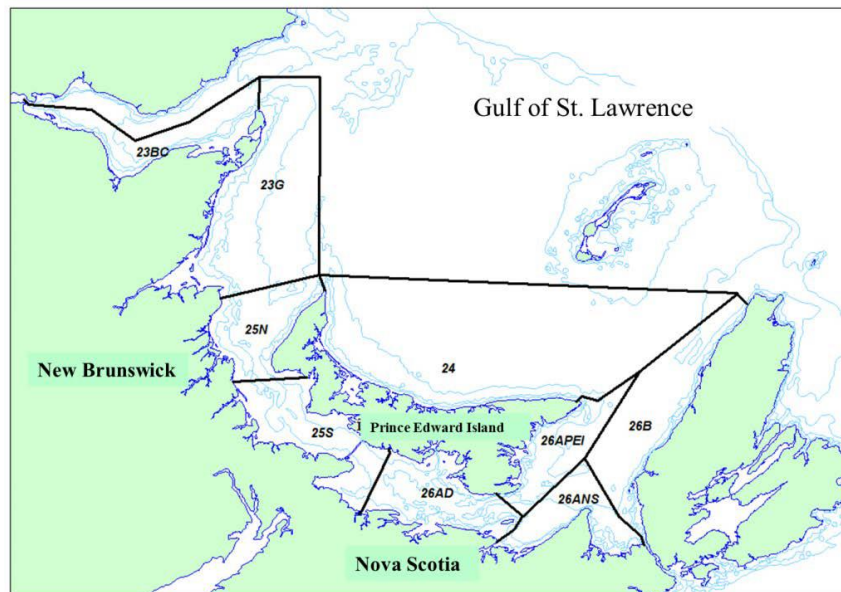
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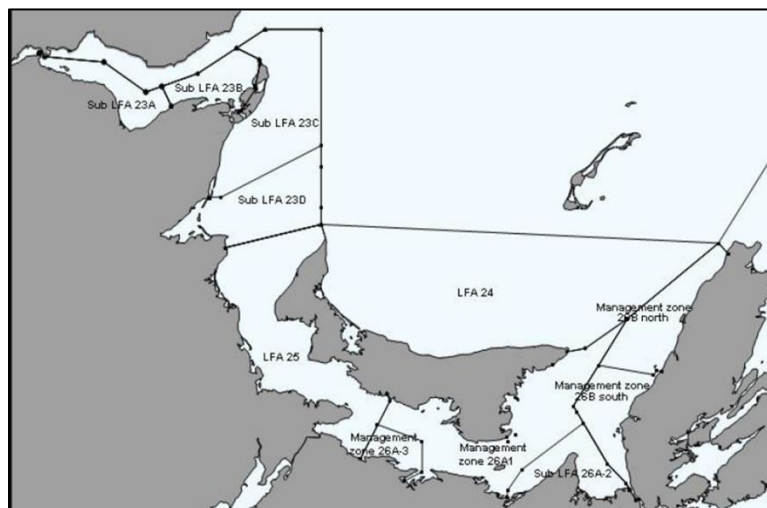
Program Description

The lobster recruitment index program is an annual sampling project designed by DFO and carried out by harvesters. Harvesters sample all lobsters caught in six consecutive traps throughout the regular fishing season. Three of the traps are standard traps used by the harvester, and the other three are modified with blocked escapes to capture small (sub-market, recruit) lobsters. Harvesters use gauges to measure the lobster, with bin sizes 1 to 13. All lobsters in bin size four and under are not of commercial size (recruits).

The Gulf Nova Scotia is divided into regions for analyses. DFO analyses scientific data based on the following “sub-regions”:



This analysis will examine the same sub-regions that DFO uses, as well as more detailed analysis of the following fishing zones, which are used for management of the fishery:



It is imperative to note that the minimum carapace length for commercial lobsters is different for each sub-zone management area. This means that the landings (number of lobsters) observed in unmodified, regular commercial traps reflects that region's specific minimum carapace length (Table 1). Since the modified traps have blocked escapes, those values are not impacted by differences in carapace length. The following table displays the legal minimum carapace length in 2018 by sub-zone (Table 1):

Table 1. 2018 legal minimum carapace length (mm) by sub-zone

Management Zone	Length (mm)
26A1	73
26A2	76
26A3	76
26 B South	81.7
26 B North	82.5

Results from Previous Years

In previous years, data collected from the Index Recruitment program was sent to DFO for analysis. DFO uses this data to inform stock assessments, and other management processes, using the number of recruits per trap as a key indicator (Figure 1). The following table (Table 2) summarizes the total number of lobsters sampled in each trap type per year, from 2000-2017 (early 2000s only sampled in several areas). Note that the number of harvesters in each LFA has fluctuated annually, so the number of lobsters per trap is a more accurate representation of changes in landings and recruitment (Table 3).

Table 2. DFO data from the recruitment index program.

LFA	Year	Participants	Lobsters Measured Modified	Modified Traps Sampled	Lobsters Measured Regular	Regular Traps Sampled	Total Lobsters Measured
26A2	2000	9	2545	1114	1916	1113	4461
	2012	8	3053	1122	2498	1122	5551
	2013	6	3144	793	2647	792	5791
	2014	10	5547	1443	4545	1443	10092
	2016	6	3499	771	2456	742	5955
	2017	5	3488	708	2443	708	5931
26A1 and 26A3	2016	4	1939	410	1162	366	3101
	2017	4	1950	651	1289	651	3239
26B	2004	9	2616	1029	2138	1028	4754
	2012	5	2915	645	1893	641	4808
	2013	4	2853	432	2116	434	4969
	2014	10	6869	1177	4889	1165	11758
	2015	4	4238	512	2606	493	6844
	2016	7	5973	878	4145	860	10118
	2017	8	7876	945	5675	945	13551

**Note: Unmodified trap landings reflects differences in minimum carapace length by LFA*

Table 3. 2016 and 2017 recruits per trap.

Zone	2016		2017	
	Recruits/trap (modified) 2016	Recruits/trap (regular) 2016	Recruits/trap (modified) 2017	Recruits/trap (regular) 2017
26A1	3.88	1.24	3	1
26A2	2.08	0.81	2.7	1.2
26A3	0.32	0.13	0.5	0.1
26A1 and 26A3	4.79	3.17	1.5	0.5
26B South	4.53	2.65	4.4	2.5
26B North	5.10	2.73	6.6	3.7

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

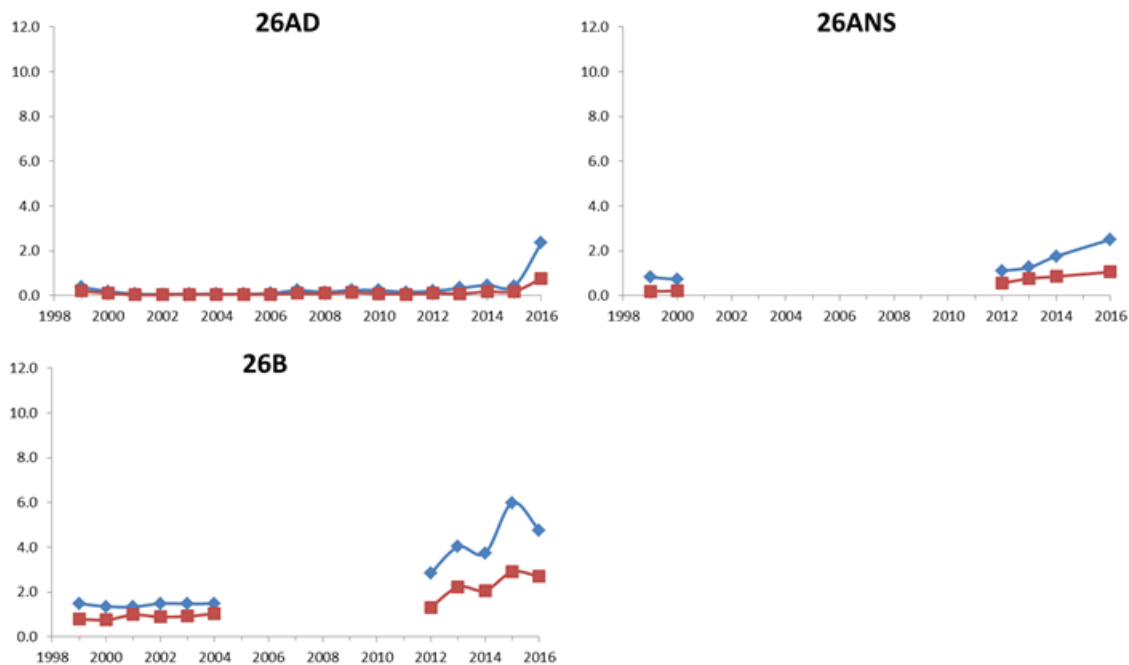


Figure 1. 2016 index results from DFO's stock assessment. Y-axis is recruits per trap. Recruits are males and females in bin size four and under, does not include berried females.

Summary Statistics from 2018

2018 marks the second year that the Index Recruitment data has been analysed by the GNSFPB, in addition to sending it to DFO science. The number of traps sampled is determined by the number of days sampled multiplied by three (three experimental traps and three regular traps are sampled each day). Recruits include male and female lobsters (excluding berried females) that are not of commercial size. When interpreting these values, keep in mind the differences in minimum carapace length and therefore trap escape size by region (Table 1). It is prudent to note that 18 harvesters have participated in the program from 2016-2018 (Figure 2). The following two sections display all results from 2018.

Table 4. Total number of lobsters sampled in modified and regular traps, 2018 (DFO science zones).

LFA's	Participants	Lobsters Measured Modified	Modified Traps Sampled	Lobsters Measured Regular	Regular Traps Sampled	Total Lobsters Measured
26A2	5	4295	630	2858	630	7153
26A1 and 26A3	5	2882	681	2165	681	5047
26B	8	9208	927	6350	927	15 558
Total	18	16 385	2 238	11 373	2 238	27 760

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

Table 5. Total number of recruit sized lobsters in regular and modified traps, 2018.

Zone	Recruits Modified	Modified Traps	Recruits Regular	Regular Traps
26A1	1017	270	607	270
26A2	2471	630	995	630
26A3	275	411	138	411
26A1, 26A3	1292	681	745	681
26B	6639	927	3809	927
26B North	4661	576	2512	576
26B South	1978	351	1297	351

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

In 2018 we had two new participants, replacing the harvesters in Pictou Island and Port Hood. The new harvesters have harbours in very close proximity to previous years, so we do not expect the recruitment data to differ because of this change.

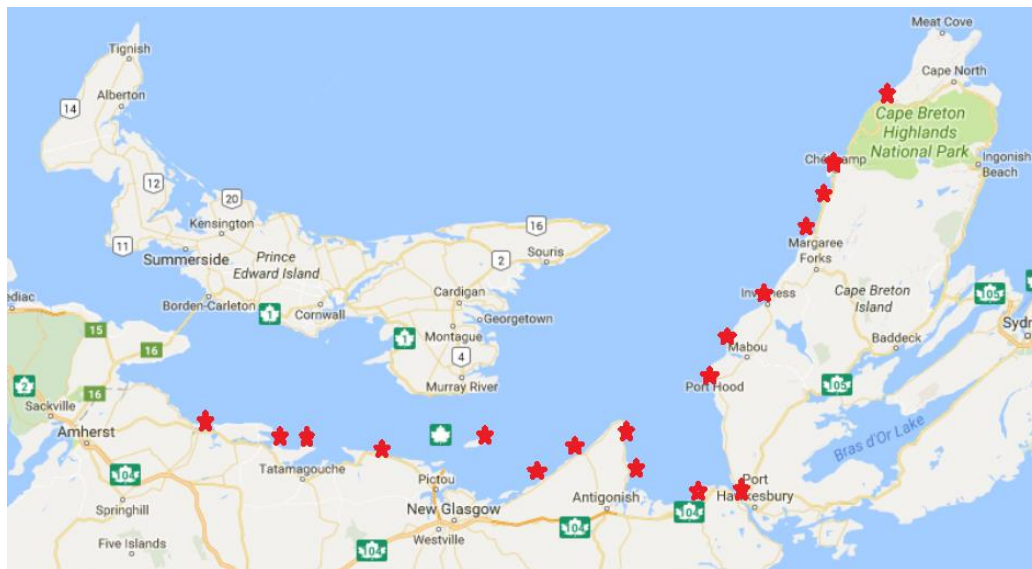


Figure 2. Map of 2018 index participant locations.

Analysis of 2018 results

The table below displays the average number of recruit sized lobsters (female, male) in modified and regular traps. As expected, modified traps have higher numbers of recruit size lobsters. The highest recruitment is seen in 26B north, at 8.1 recruit sized lobsters per modified trap. Recruitment appears to be the lowest in 26A3, at with an average of 0.7 lobsters per modified trap. Figures 3 and 4 display recruits/trap in DFO science zones as well as fishery management zones.

Table 6. 2018 recruits per trap.

Zone	Recruits/Modified Trap	Recruits/Regular Trap
26A1	3.7	2.2
26A2	3.0	1.6
26A3	0.7	0.3
26A1, 26A3	1.9	1.1
26B	7.2	4.1
26B North	8.1	4.4
26B South	5.6	3.7

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

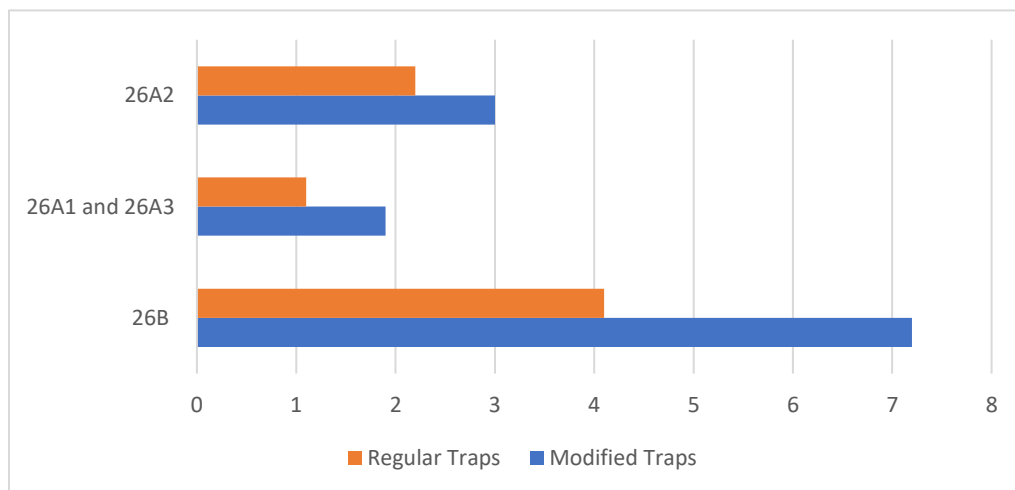


Figure 3. 2018 recruitment data for DFO science regions.

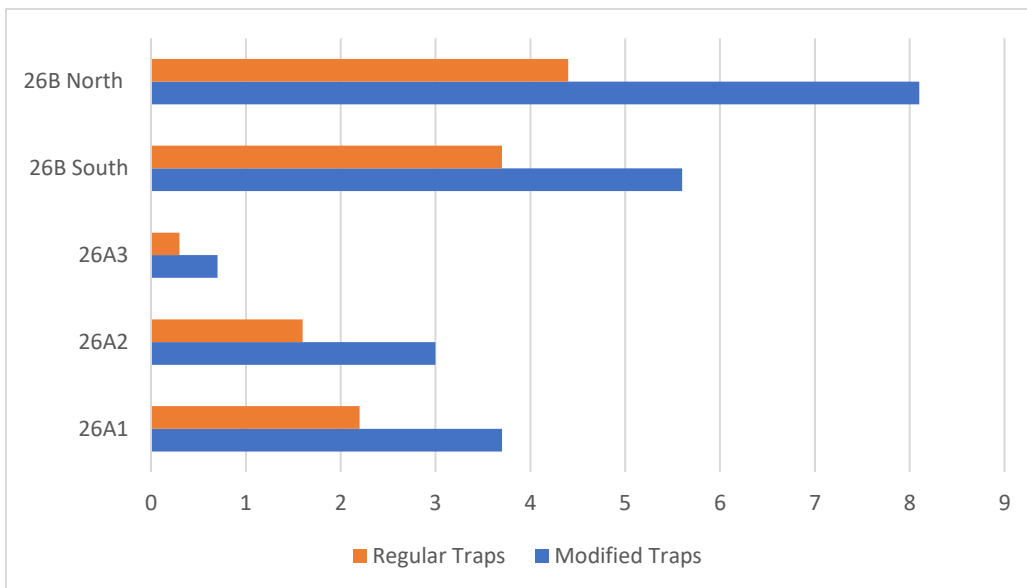


Figure 4. 2018 recruitment data for management areas in the Gulf of Nova Scotia

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

The total number of recruit sized berried females is an indicator of stock growth in the coming years. The following table compares the average number of recruit size berried females caught in experimental traps in 2018. These values are the average number of lobsters in **all** traps, not **per** trap as above. Similarly, there appears to be high reproductive potential in 26B (North and South), and growing rates of recruitment in 26A1, using berried females as a growth indicator.

Table 7. Average number of recruit size berried females caught in experimental traps in 2018.

LFA	Year	Regular traps	Modified traps
26A1	2017	13	23
	2018	50	44
26A2	2017	37.4	56.4
	2018	33.8	54.8
26A3	2017	3	0.7
	2018	5	6
26B South	2017	61.3	97.8
	2018	90.3	115
26B North	2017	91.5	160.75
	2018	89.9	135

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

Below, the average total number of recruit size lobsters caught in each area was broken down in to bin sizes one through four. Regular traps are displayed in table 7, and modified traps are shown in table 8. These tables provide insight for recruitment in the coming years.

Table 8. Average number of recruit size berried females caught in **regular** traps, 2016-2018.

Regular Traps		Bin Size			
LFA	Year	1	2	3	4
26A1	2016	1.5	27.5	47.5	116.5
	2017	1.0	15.5	35.0	96.0
	2018	1.0	27.5	85.5	189.5
26A2	2016	2.2	12.6	33.6	83.0
	2017	1.8	20.2	67.2	117.2
	2018	1.5	16.4	57.6	157.4
26A3	2016	0.0	0.0	3.5	12.0
	2017	0.7	1.3	5.0	9.3
	2018	1.5	2.0	7.3	4.3
26B North	2016	15.8	50.3	106.0	259.5
	2017	12.0	45.8	132.3	346.0
	2018	0.0	4.4	28.4	57
26B South	2016	6.3	49.3	124.0	185.8
	2017	6.3	49.3	124.0	185.8
	2018	9.0	61.0	200.3	252.3

*Note: Unmodified trap landings reflects differences in minimum carapace length by LFA

Table 9. Average number of recruit size berried females caught in **modified** traps, 2016- 2018.

Modified Traps		Bin Size			
LFA	Year	1	2	3	4
26A1	2016	3.5	159.5	198.0	231.5
	2017	0.5	86.5	123.5	229.0
	2018	4.0	105.0	189.5	254.0
26A2	2016	8.6	64.8	122.2	125.8
	2017	10.8	73.8	164.4	185.2
	2018	6.8	82.75	214.25	280.75
26A3	2016	1.0	4.0	11.0	20.5
	2017	1.7	14.0	13.0	28.0
	2018	0.0	0.0	2.0	4.0
26B North	2016	70.8	191.5	231.0	268.8
	2017	55.5	196.3	285.5	411.8
	2018	59.8	243.0	354.4	410.0
26B South	2016	17.3	145.8	225.0	220.3
	2017	17.3	145.8	225.0	220.3
	2018	18.3	172.7	305.3	278.0

Interpretation

The key recruitment indicators in this project are recruits per trap, average recruits by bin sized and total number of berried recruit sized females. Looking below to Table 6, we see that recruitment has increased in all LFA's from 2017 levels. With the exception of recruits/modified trap in 26A1, the 2018 recruitment levels have increased from 2016 levels as well. The average increase in recruit/trap for all locations from 2017 to 2018 is 0.975 lobsters; rounding up to an average increase in 1 recruit sized lobster per trap sampled in 2018. As noted above, strongest recruitment appears to be in 26B North, 26B South and lower (but still growing on average) on the mainland.

This data is further broken down in tables 7 and 8, where we see the distribution of lobsters in each bin size. A lobster in bin size 1-2 may still be 5-7 years from commercial size, so following the pulses in this data in future years will be essential to predicting stock growth or depression.

From our berried female data in table 6, we observed that recruitment by berried females is up in 26A1, 26A3 and 26B South. The biggest increase was observed in in 26A1, with an increase in berried recruits of 37 lobsters in modified and 21 lobsters in regular traps. 26A2 and 26B North both saw slight declines in the number of berried female recruits sampled. This could be due to a variety of factors, such as the strong wind conditions sustained over longer periods of time, encouraging young or berried females to seek cover.

Table 10. Summary of recruits per trap from 2016-2018

Zone	2016		2017		2018	
	Recruit/trap Modified	Recruit/trap Regular	Recruit/trap Modified	Recruit/trap Regular	Recruit/trap Modified	Recruit/trap Regular
26A1	3.88	1.24	3	1	3.7	2.2
26A2	2.08	0.81	2.7	1.2	3.0	1.6
26A3	0.32	0.13	0.5	0.1	0.7	0.3
26B North	5.10	2.73	6.6	3.7	8.1	4.4
26B South	4.53	2.65	4.4	2.5	5.6	3.7

**Note: Unmodified trap landings reflects differences in minimum carapace length by LFA*

Acknowledgements

The GNSFPB would like to thank all the participants from 2018 and previous years for their efforts in collecting this valuable data. The collection of this data would not be possible without harvester participation. The data is used for improving understanding of the lobster stock and future of the fishery in the Gulf of Nova Scotia.