

Short-Term and Long-Term Effectiveness of the PLB Intervention Among Newfoundland and Labrador Fish Harvesters

**A Report Submitted to the
Canadian Center for Fisheries Innovation**

Submitted by

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1 Introduction

Commercial fishing continues to be one of the most dangerous occupations worldwide, with higher fatality and injury rates compared to national averages for all other occupations (International Labour Organization [ILO], 2023; Petursdottir et al., 2001). In 1999 the average annual number of fishing deaths worldwide was estimated to be 24,000 people (ILO, 2000), which had increased to 32,000 by 2019 (Food and Agriculture Organization, 2024). However, recent research conducted by the FISH Safety Foundation have demonstrated that these estimates are conservative and fishing-related death estimates are well in excess of 100,000 per year (Willis et al., 2023). In Canada, there were 97 fatalities reported in the fishing industry from 2008 to 2017, and in 2018 alone there were 19 fatalities, which was nearly double the 10-year annual average of 9.7 (Transportation Safety Board [TSB], 2019). More recent data indicates that there were an additional 35 fishing-related fatalities reported in Canadian waters in the three-year span from 2019 to 2021 (TSB, 2022).

Drowning as the result of vessel disasters and falls overboard make up a larger portion of the fatalities (Jensen et al, 2014; TSB, 2022). To mitigate drowning related fatalities, a personal floatation device (PFD) or lifejacket is the most critically important piece of personal protective equipment (PPE) for ensuring a person stays afloat when they are in the water. However, if the individual is lacking sufficient thermal protection, it also becomes critically important that they be rescued as quickly as possible to reduce their exposure time. One of the most versatile and reliable methods for alerting rescuers is

an emergency radio beacon, such as a personal locator beacon (PLB). PLBs are commercially available electronic radio frequency devices that have helped save thousands of people in distress worldwide each year.

Despite the demonstrated benefits, failure to use PFDs and emergency signaling devices, such as PLBs, has been identified as a factor leading to fatalities in fishing vessel accidents (TSB, 2012). When the TSB examined 63 fishing vessel-related fatalities between 2011 and 2017, they found that the use of a PFD could not be ascertained for 80 percent of cases. Similarly, accident investigation reports have often concluded that boating accidents, especially those involving smaller vessels, did not send any emergency distress signal and went undetected until the boat was reported overdue (TSB, 2022). Not wearing a PFD or PLB has been identified as factors leading to fatalities in fishing vessel accidents (TSB, 2022; Lincoln & Lucas, 2010).

Since PFDs have been around for a long time, there have been some interventions aimed at increasing the use of PFDs by fish harvesters over the years. However, since PLBs are a relatively newer technology, there appears to be less awareness about the device and its benefits. To address this gap, the Newfoundland and Labrador Fish Harvesting Safety Association (NL-FHSA), Professional Fish Harvesters Certification Board, Fish Food and Allied Workers Union, and Fish Harvesters' Resource Centre introduced a personal locator beacon (PLB) campaign on February 14, 2022. The intervention aimed to reduce barriers to PLB adoption, such as cost and accessibility, by

subsidizing the cost and providing fish harvesters in Newfoundland and Labrador with direct access to in-stock PLBs ready for purchase.

The objective of this report is to assess the short-term and long-term effectiveness of the PLB campaign. Specifically, to evaluate (1) the reach of the intervention among fish harvesters, (2) changes in PLB use and intention to use following intervention implementation, and (3) trends in PLB uptake over time as reflected in registration data.

2 Methodology

2.1 Study Design

This study used a repeated cross-sectional design to evaluate the short- and long-term effectiveness of the PLB campaign among fish harvesters in Newfoundland and Labrador. Data were collected from three online survey administered at different times following the implementation of the intervention, along with objective data on PLB registrations. The intervention was introduced on February 14, 2022. Survey 1 was launched on January 9, 2024 and closed on February 6, 2024. While Survey 2 ran from June 18, 2025 to August 18, 2025, and Survey 3 ran from January 8, 2026 to March 27, 2026.

2.2 Participants

Participants included professional fish harvesters in Newfoundland and Labrador aged 15 years and older. The research team worked with the industry partners, using their communication channels (e.g., email distribution lists), to recruit professional fish

harvesters in Newfoundland and Labrador to participate in the study. Participants were also recruited through local fish harvester's communities on social media (e.g., Newfoundland Fisherman's Forum) and the Marine Institute's Community Based Education Delivery program.

2.3 Intervention

The intervention was a PLB campaign that was introduced province wide on February 14, 2022 by the NL-FHSA in collaboration with industry partners. The campaign used a cost-share model to improve access to PLBs and provided direct access to in-stock devices through a designated distribution channel. During the beginning of the campaign, 2500 PLBs were made available at 40% of the regular cost and open to one PLB per enterprise. The offer was later extended to all owners, operators, and crewmembers. In addition to the 60% subsidized rate, the campaign emphasized the role and effectiveness of a PLB in an emergency, including an informational video on how to properly test and activate the PLB.

2.4 Survey Instrument

The online questionnaires were developed using the Qualtrics survey software (Qualtrics, 2024). The questionnaires included questions about participant demographics, fishing experience and activities, behaviour around use of PFDs and PLBs, and factors associated with the use of PFDs and PLBs. Measures of rate of use and intention to use were used to determine the fish harvesters' stage of change for PLB use. Stages of change for PLB use were assessed using the Transtheoretical

Model, which categorizes individuals based on their readiness to adopt a behaviour (precontemplation, contemplation, preparation, action, and maintenance).

Small modifications were made between Survey 1 and 2, with no changes between Survey 2 and 3. For Survey 2 and 3, participants who indicated they completed a previous survey did not have to complete questions related to demographics or fishing experience and activities. Features of the Qualtrics survey software, such as skip logic and branching, were used to improve the flow of the questionnaire by only showing the most relevant questions to each participant.

2.5 Survey Data Collection

Survey 1 was launched on January 9, 2024, with Survey 2 on June 18, 2025, and Survey 3 on January 8, 2026. Survey 1 remained available for 29 days, with Survey 2 for 62 days and Survey 3 for 79 days. Surveys 2 and 3 remained open for a longer period of time than Survey 1 in an attempt to have a similar response rate across all three surveys. Following the initial recruitment communications, reminders were sent by the industry partners and posted on social media to maintain response momentum for each survey.

Fish harvesters who decided to participate in the study followed the link or QR code provided in the recruitment communications and were asked to complete a consent form followed by an anonymous online questionnaire. For each survey, they were asked to provide a unique code that was easy for them to remember but could not be used to identify them. In an attempt to help the fish harvesters remember their unique code in

the event they returned to complete another survey, we suggested that they use their initials and last four digits of their phone number. If they returned for Survey 2 or 3, they were reminded that we suggested their initials and last four digits of their phone number. When the data were cleaned and screened for repeats in unique codes, only six codes could be matched across all the surveys.

When participants reached the end of the questionnaire, participants were given the option to enter a prize draw for a chance to win a new PLB or an inflatable PFD that was donated by the Professional Fish Harvesters Certification Board and NL-FHSA.

2.6 PLB Registration Data

Registration data for all PLBs registered in Newfoundland and Labrador were obtained from the Canadian Beacon Registry on April 10, 2025. The data included the date of registration with all other identifiers removed. There was no information provided on the type of activity associated with the PLB, therefore this data should be interpreted as PLB registration by all of Newfoundlanders and Labradorians and not just fish harvesters.

Data were aggregated by calendar year with all data prior to 2022 being grouped together to represent registrations pre-implementation of the PLB campaign, while registrations from 2022, 2023, and 2024 post-implementation of the PLB campaign.

2.7 Ethics Approval

Ethics was sought and approval granted from Memorial University's Interdisciplinary Committee on Ethics in Human Research (ICEHR) on October 10, 2023. Additional amendments were submitted and approved prior to Survey 2 and 3. The amendments included minor changes to the questionnaire, consent form, and recruitment material.

2.8 Sensitivity Analysis

As noted above, participants were asked to provide a unique identification code so that responses could be matched across the three surveys to allow for longitudinal analysis. However, only six codes could be matched across all surveys, which was insufficient for meaningful within-subject analyses. Therefore, the survey data were analyzed as three repeated cross-sectional samples and comparisons were made between surveys to examine changes over time.

Because most respondents could not be reliably matched across all surveys, responses were analyzed as independent observations. A sensitivity analysis compared respondents who provided a unique identification code with those who did not to assess whether the groups across key variables. Fisher's Exact Test indicated no statistically significant differences (all $p > 0.05$), suggesting the distribution of responses were similar across the two groups. Therefore, all data were retained for analysis.

3 Results

3.1 Participants

A total of 392, 340, and 358 fish harvesters completed Survey 1, 2, and 3, respectively. For those that completed all three surveys, only 6 could be matched with a unique code. Table 1 shows that the demographics for the fish harvesters were similar across the surveys, with similar distributions for age, gender, years of fishing experience, swim ability, and vessel characteristics. The majority fish harvesters that participated in each survey were 35-64 years of age, males, and reported having more than 10 years of fishing experience. In addition, the majority reported that they fished from a decked longliner followed by an open speed boat. Similar distribution of participant demographics across surveys allows us to interpret any differences in the data as changes over time rather than simply differences between groups.

Table 1 Participant demographics by survey

Participant demographics by survey (N, (%))¹			
	Survey 1	Survey 2	Survey 3
Characteristic	N = 392	N = 340	N = 358
Age group			
15-24	10 (2.6%)	22 (7.2%)	12 (4.1%)
25-34	48 (12%)	46 (15%)	34 (12%)
35-44	67 (17%)	62 (20%)	66 (23%)
45-54	130 (33%)	81 (26%)	85 (29%)
55-64	94 (24%)	72 (24%)	66 (23%)
65 or more	43 (11%)	23 (7.5%)	29 (9.9%)
Unknown	0	34	66
Gender			
Female	65 (17%)	75 (25%)	56 (19%)
Male	326 (83%)	230 (75%)	236 (81%)

Participant demographics by survey (N, (%))¹			
	Survey 1	Survey 2	Survey 3
Characteristic	N = 392	N = 340	N = 358
Unknown	1	35	66
Years of fishing experience			
less than 5 years	44 (11%)	72 (25%)	55 (19%)
6-10 years	50 (13%)	45 (15%)	44 (15%)
11-20 years	72 (19%)	65 (22%)	61 (21%)
21-30 years	78 (20%)	52 (18%)	46 (16%)
more than 30 years	143 (37%)	59 (20%)	83 (29%)
Unknown	5	47	69
Swim ability			
Cannot swim	82 (21%)	63 (21%)	60 (21%)
Beginner / weak swimmer	119 (31%)	85 (29%)	85 (29%)
Good swimmer	186 (48%)	146 (50%)	147 (50%)
Unknown	5	46	66
Vessel type			
Open speed boat	132 (34%)	110 (37%)	109 (37%)
Decked longliner	226 (59%)	179 (60%)	173 (59%)
Factory freezer trawler	27 (7.0%)	8 (2.7%)	12 (4.1%)
Unknown	7	43	64
Vessel length			
under 30'	124 (32%)	99 (33%)	106 (36%)
30' - 39'11"	108 (28%)	93 (31%)	93 (32%)
40' - 64'11"	114 (30%)	78 (26%)	66 (22%)
65' or more	37 (9.7%)	27 (9.1%)	29 (9.9%)
Unknown	9	43	64

¹ Percentages are based on valid responses. Unknown categories represent missing responses and are not included in percentage calculations.

3.2 Intervention Awareness

For all three surveys, the majority of fish harvesters reported that they had heard about the PLB campaign. There was a slight increase in the number of fish harvesters that reported hearing about the PLB campaign from Survey 1 (89%) to Survey 2 (92%), with

a small decrease back down to 89% for Survey 3. The PLB campaign reached more than 89% across all three surveys. (Figure 1)

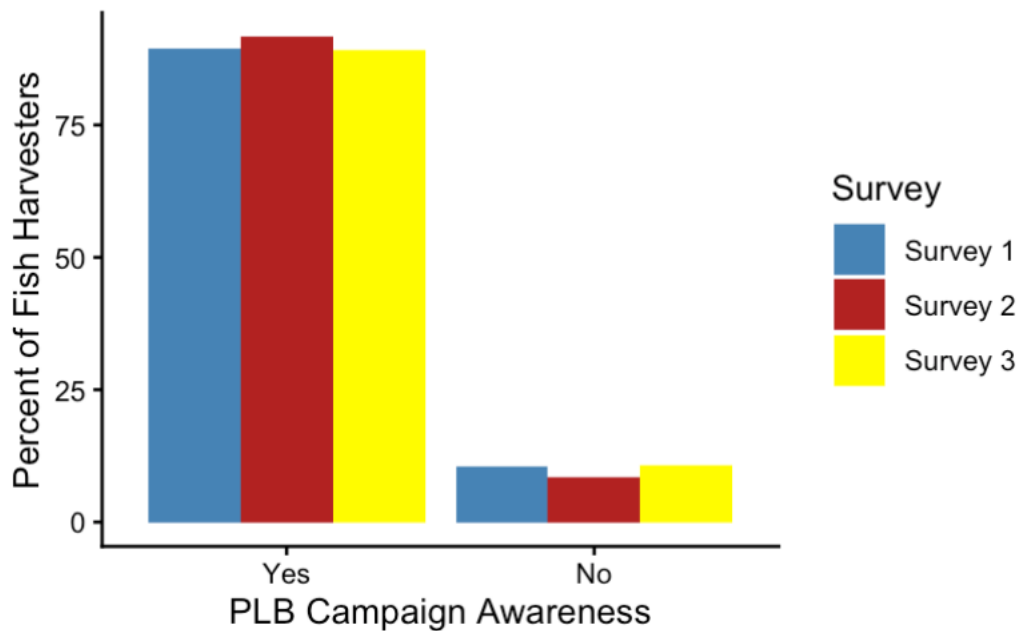


Figure 1 Percentage of fish harvesters reporting awareness of the PLB campaign, stratified by survey

3.3 PLB Usage Rate and Intention

Figure 2 shows that the number of fish harvesters reporting use of PLB increased across the surveys. The proportion reporting always using a PLB increased from 12% in Survey 1 to 26% in Survey 2 and 28% in Survey 3. Similarly, the proportion reporting often and rarely using a PLB increased across the surveys. Concurrently, the number of fish harvesters reporting never using a PLB decreased across the surveys, with 76% for Survey 1 to 46% in Survey 2 and 40% in Survey 3.

Aligning with the shift in usage, fish harvesters showed a shift toward the later stages of behaviour change for PLB use across the surveys. The proportion of fish harvesters in the precontemplation, contemplation, and preparation stages decreased across the

surveys, while the proportion of fish harvesters in the action and maintenance stages increased. The largest proportion of fish harvesters were in the preparation stage during Survey 1 and maintenance stage during Survey 2. (Figure 3) This shift indicates a positive move from planning to sustained behaviour, suggesting that more fish harvesters are not only adopting PLBs but continuing to use them.

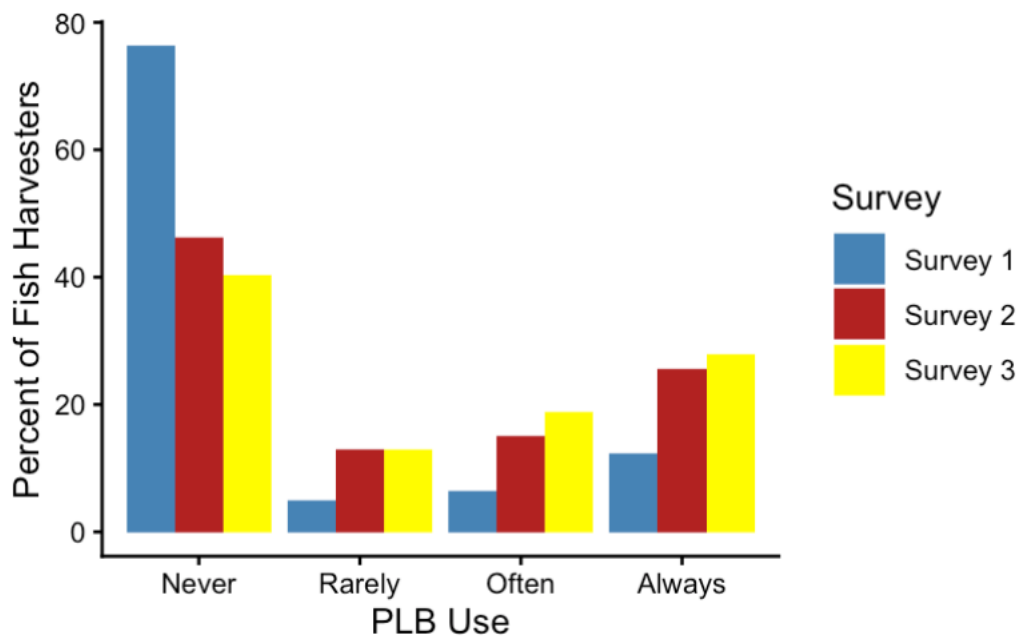


Figure 2 Percentage of fish harvesters reporting frequency of PLB use, stratified by survey

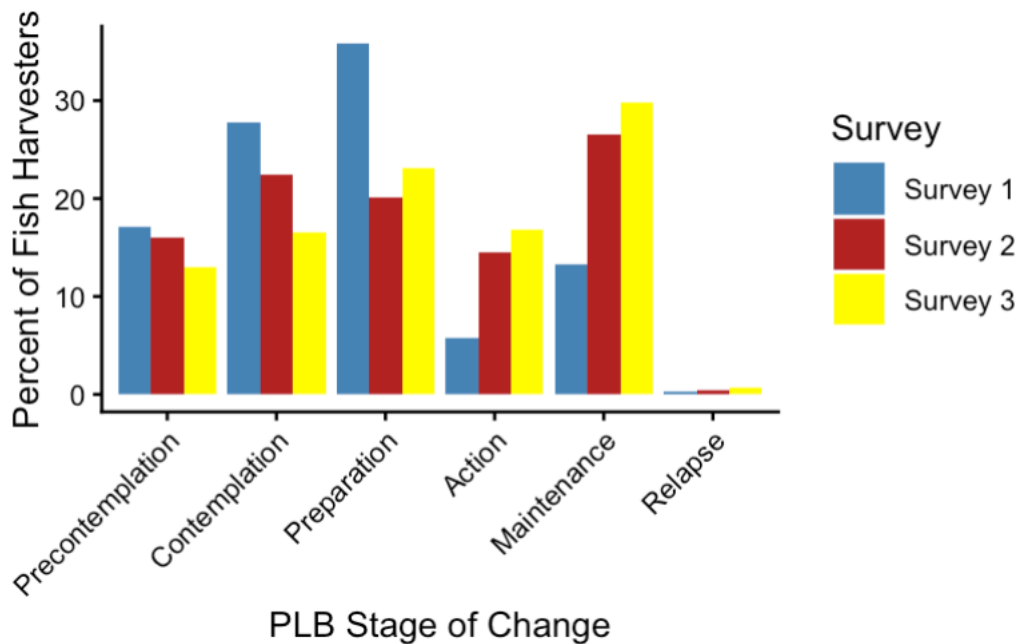


Figure 3 Percentage of fish harvesters by stage of behaviour change for PLB use, stratified by survey

3.4 PLB Acquisition

Figure 5 shows that fish harvesters acquired their PLBs from different sources with the percentage reporting they received a PLB from the NL-FHSA, FRC, FFAW, or PFHCB (also known as the campaign) increasing from Survey 1 (27%) to Survey 2 (50%) and Survey 3 (52%).

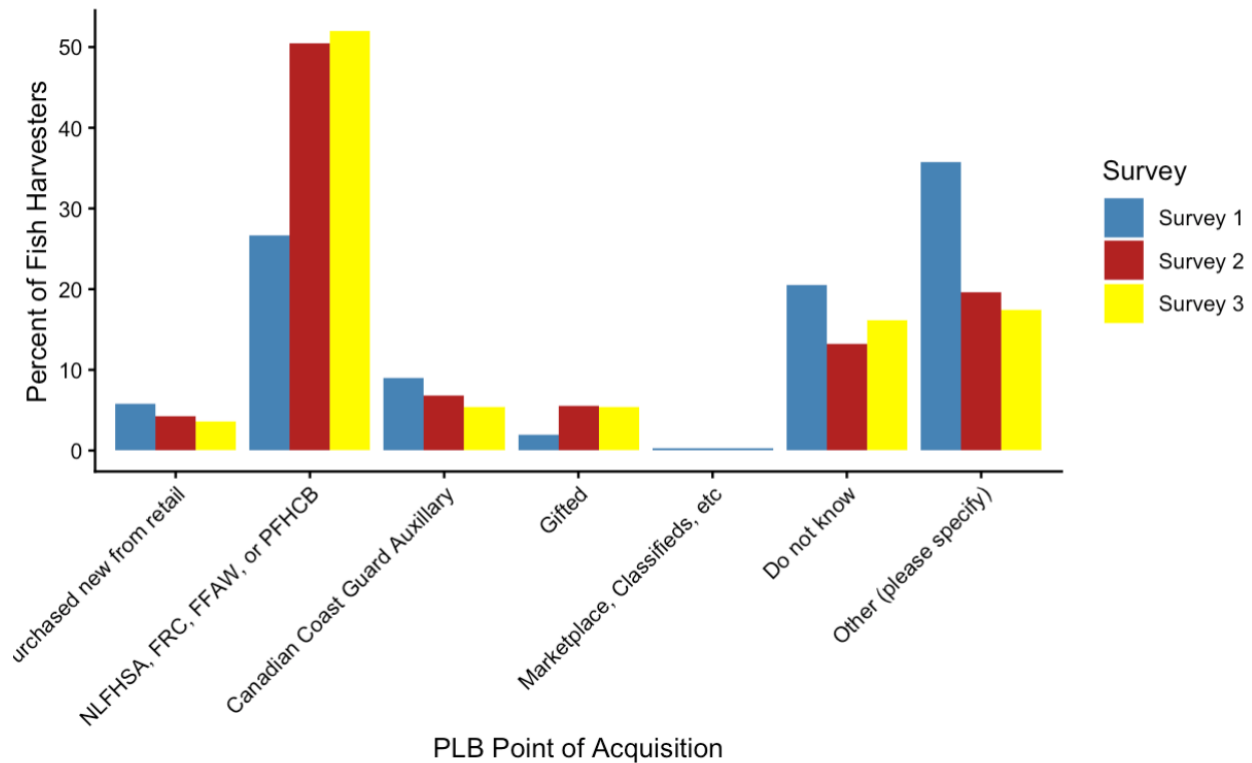


Figure 4 Percentage of fish harvesters reporting PLB point of acquisition, stratified by survey

3.5 PLB Knowledge and Perceived Effectiveness

When asked about the steps for activating a PLB only 23% could correctly identify the steps in Survey 2, while almost 34% choose an incorrect sequence of steps and 44% indicated that they were unsure. The proportion of fish harvesters that could correctly identify the steps for activating a PLB increased slightly to 28% in Survey 3, with those choosing an incorrect sequence of steps staying about the same at almost 33% and those indicating they were unsure decreasing to 39%. This question was not asked in Survey 1. (Figure 5)

Figure 6 shows that the majority of fish harvester reported that PLBs are very effective in all three Surveys, with 62% in Survey 1 decreasing slightly to 59% in Survey 2 and then increasing again to 65% in Survey 3.

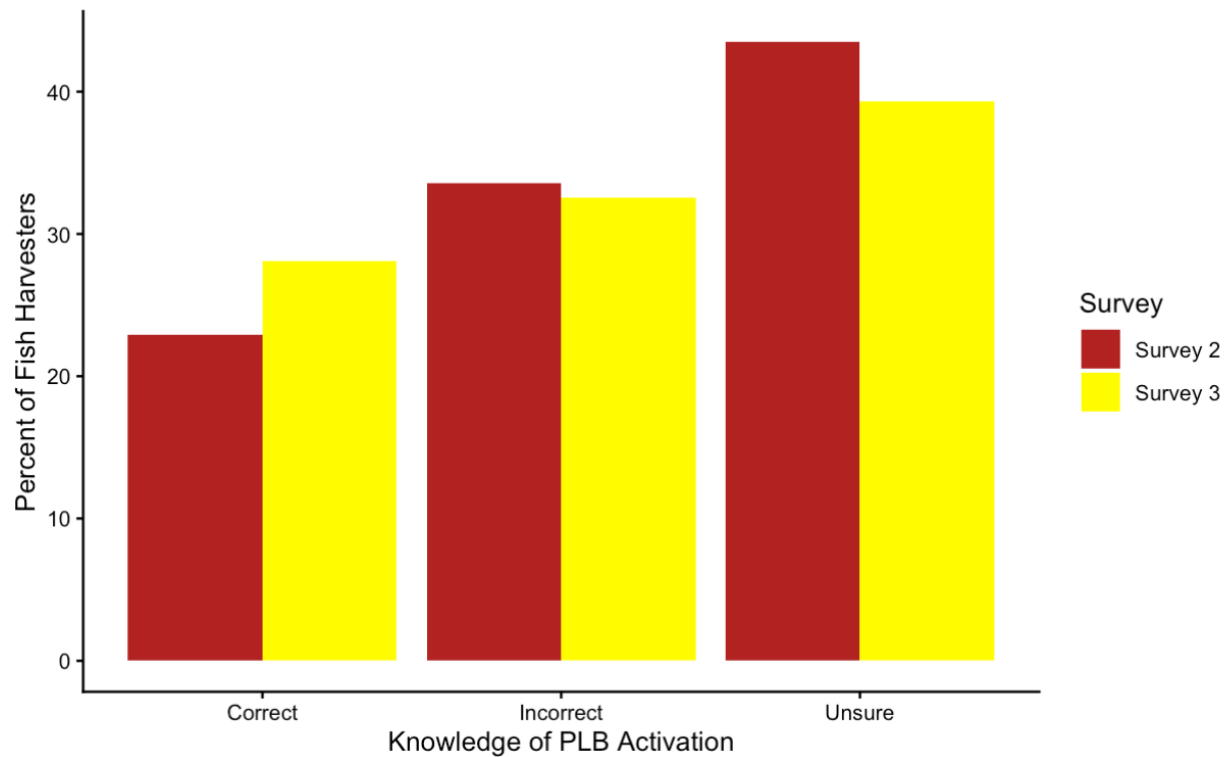


Figure 5 Percentage of fish harvesters correctly identifying the steps for activating a PLB, stratified by survey

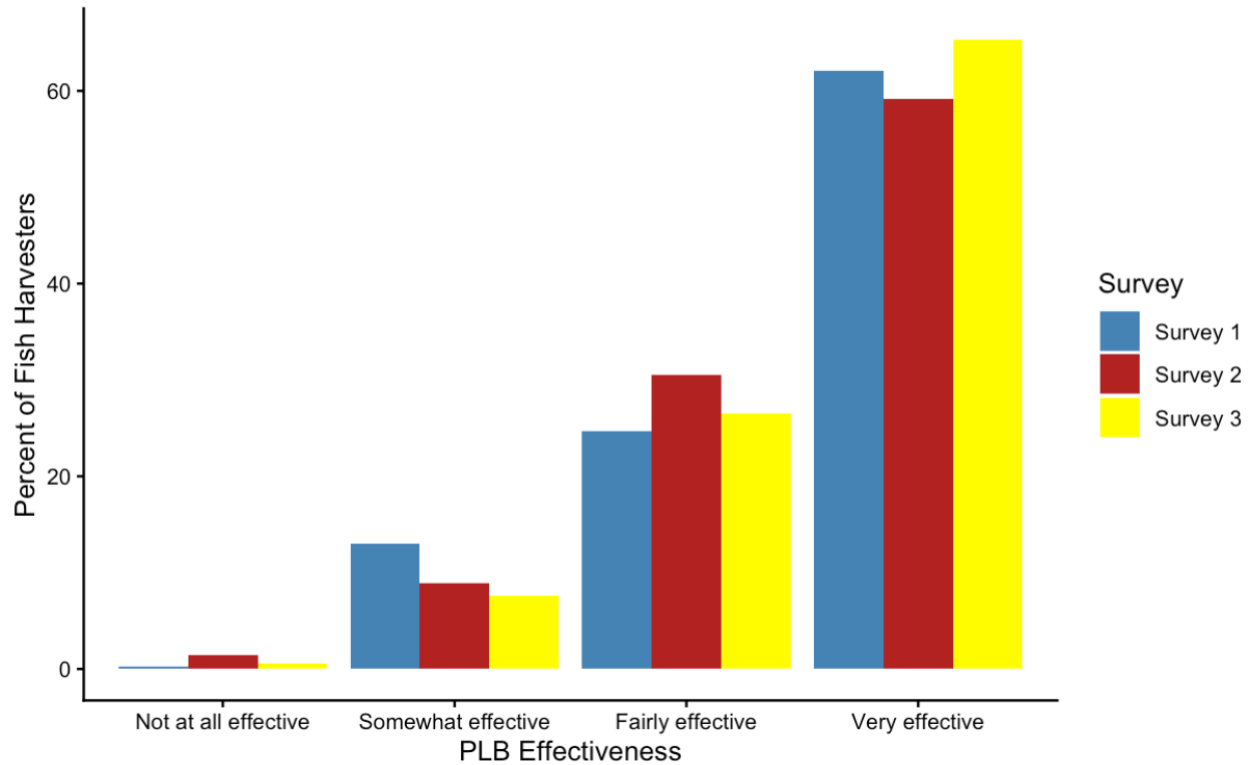


Figure 6 Percentage of fish harvesters reporting perceived effectiveness of PLBs, stratified by survey

3.6 Perceived Barriers

Figure 7 and Figure 8 show the proportion of fish harvesters that perceive PLBs to be affordable and accessible for purchase in stores. Fish harvesters' perceptions of PLB affordability varied across surveys. In Surveys 1 and 3, fewer fish harvesters agreed that PLBs were affordable (43% and 46%, respectively) than those who disagreed (57% and 54%, respectively). In Survey 2 more fish harvesters agreed that PLBs were affordable (54%) than those who disagreed (46%).

Overall, there appears to be an even split of fish harvesters that perceive PLBs to be easily found in stores for purchase across all three surveys, with slightly more disagreeing (51%) than agreeing (49%) in Survey 3.

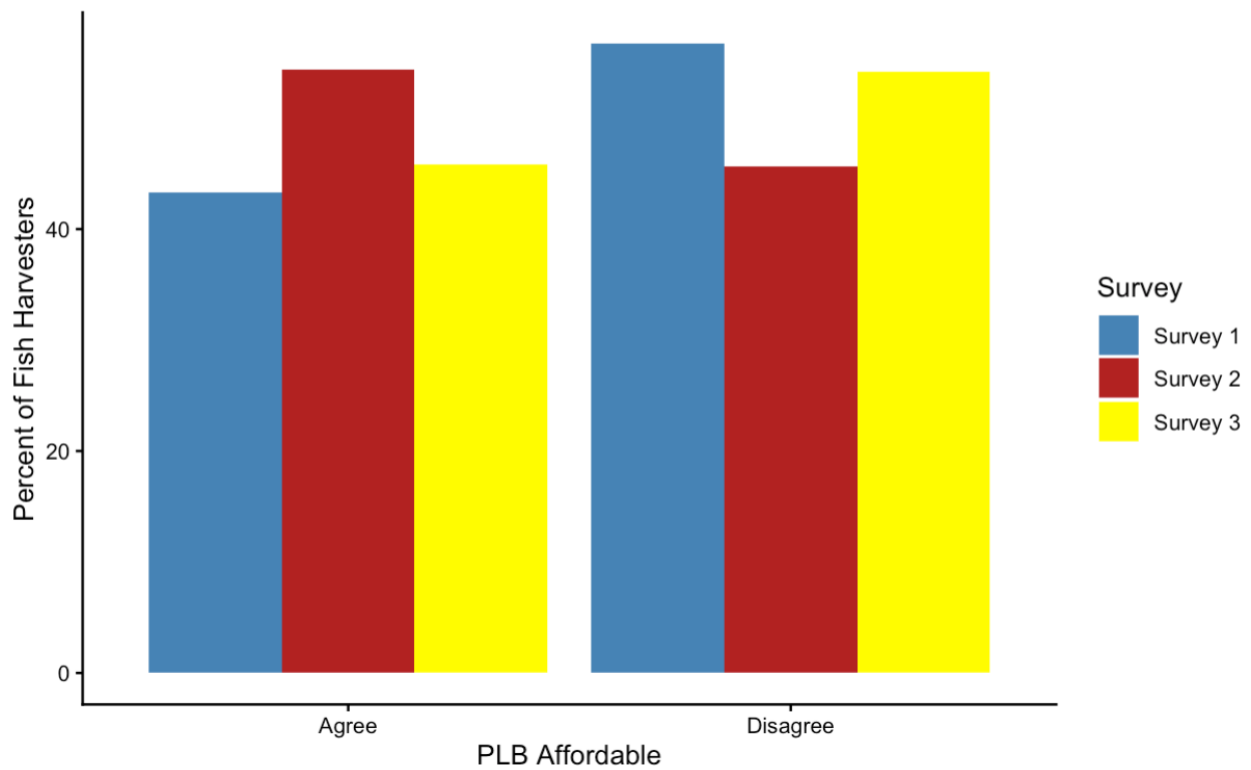


Figure 7 Percentage of fish harvester reporting PLB are affordable, stratified by survey

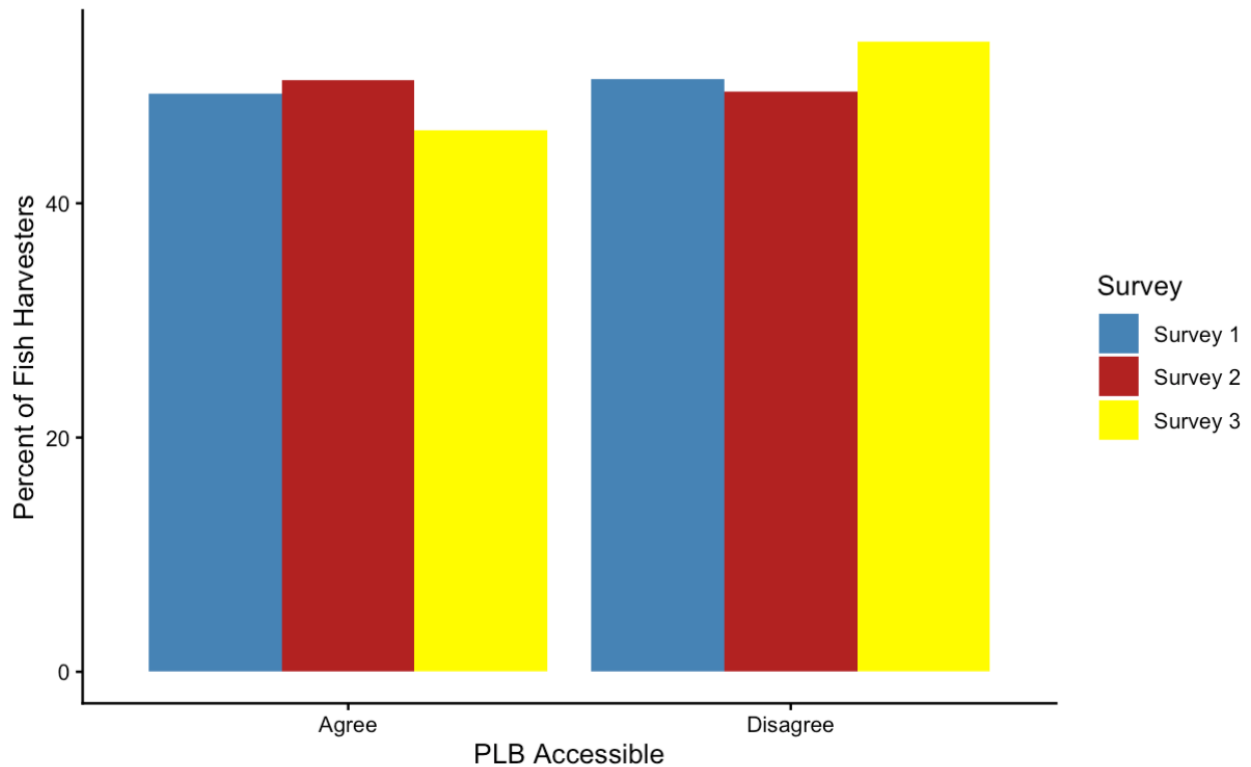


Figure 8 Percentage of fish harvesters reporting PLB can be easily found in stores for purchase, stratified by survey

3.7 PLB Registrations

The number of PLBs registered in Newfoundland and Labrador (NL) with that Canadian Beacon Registry increased over time. The total number of PLB registrations in NL prior to the intervention in 2022 was 384. By the end of 2022, the number had increased to 805 (a 110% increase), by the end of 2023 it was 2043 (a 432% increase), and by the end of 2024 it was 2781 (a 624% increase). The largest increase occurred in 2023 with 1238 PLBs being added to the registry that year alone. (Figure 9)

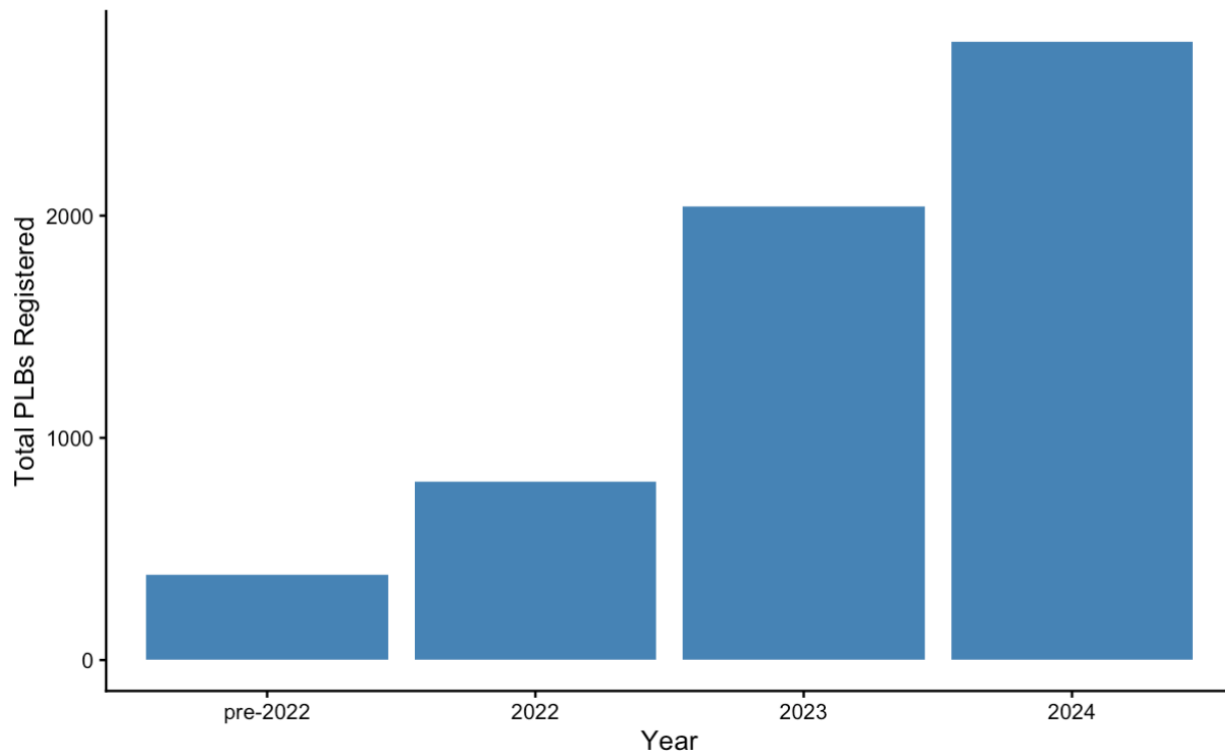


Figure 9 Annual number of PLBs registered in Newfoundland and Labrador from inception to the end of 2024. Registrations prior to 2022 were aggregated to illustrate uptake before the intervention.

4 Discussion

The objective of this report was to assess the short-term and long-term effectiveness of the PLB campaign among fish harvesters in Newfoundland and Labrador. Specifically, to evaluate (1) the reach of the intervention among fish harvesters, (2) changes in PLB use and intention to use following intervention implementation, and (3) trends in PLB uptake over time as reflected in registration data. Combined, a total of 1090 surveys were completed by fish harvesters in NL across the three surveys – 392 for Survey 1, 340 for Survey 2, and 358 for Survey 3. For those that completed all three surveys, only 6 could be matched with a unique code. Therefore, the survey data were analyzed as

three cross-sectional samples, and comparisons were made between survey waves to assess changes over time.

Overall, the results suggest that the PLB campaign reached the majority of fish harvesters and there was increased and sustained PLB uptake and use. The PLB campaign may have contributed to observed increases in PLB awareness and uptake, particularly through efforts to reduce cost barriers and enhance industry-wide promotion. With more than 89% of fish harvesters reporting awareness of the PLB campaign, and an increase in PLB acquisition through the campaign, these findings suggest that the intervention's delivery approach (i.e., efforts to reduce cost barriers and provide direct access to in-stock devices) was effective. In addition, there was a noticeable shift in reported PLB use and a shift toward the later stages of behaviour change and their intention to use PLBs, demonstrating movement towards sustained adoption. The shift from preparation to maintenance suggests that the PLB campaign may have contributed to the initial adoption of PLBs as well as sustained use.

Objective data obtained from the Canadian Beacon Registry further support our study's findings, with registrations increasing from 384 for all years prior to 2022 to 2,781 by the end of 2024, representing an approximate 624% increase. The largest increase occurred in 2023, one year after the PLB campaign was implemented. The increase in registrations is an indicator of increased PLB use. While the Canadian Beacon Registry data are not specific to fish harvesters, the timing of the increase in PLB registrations

aligns with the implementation of the PLB campaign, further suggesting that the campaign contributed substantially to PLB uptake within the province.

While there has been an observed improvement in the ownership and usage of PLBs by NL fish harvesters, the importance of knowing how to properly operate it should not be overlooked. It is one thing to own safety equipment, but it serves no purpose if it cannot be properly operated when needed. The majority of fish harvesters were unable to correctly identify the steps required to activate a PLB. This highlights the importance of ensuring interventions include operational knowledge when promoting the uptake of new safety devices such as PLBs.

The perceived barriers of cost and accessibility remained somewhat high across all surveys, with about half of fish harvesters reporting that PLBs were not affordable or easy to purchase in stores. While the campaign addressed these barriers, it is important to note that once the campaign ends the cost and accessibility may remain barriers that will influence decision-making for some fish harvesters in the future. Continuing to address these barriers by educating on cost-benefit and ensuring access in stores may help further improve uptake.

The use of multiple time points and integration of self-reported and objective data are key strengths of this study. Some limitations of this study should be acknowledged: since responses could not be reliably linked across surveys, analyses were limited to cross-sectional comparisons, and individual-level changes over time could not be

assessed. Additionally, data were collected using self-reported questionnaires, which are susceptible to recall bias and social desirability effects. As a result, reported rates of PFD and PLB use may be overestimated relative to actual behaviour.

It is also important to note that the Canadian Beacon Registry data is not specific to fish harvesters in NL, but rather all NL and, thus, could also include recreational boaters, hikers, and hunters. Therefore, the data should be interpreted as PLB adoption by all Newfoundlanders and Labradorians rather than a direct measure of PLB adoption by NL fish harvesters. However, the only other PLB intervention that we are aware of during this time was a distribution of PLBs to the Canadian Coast Guard Auxiliary members, whom the majority are fish harvesters. We do not know of any other PLB interventions directed at recreational boaters or those participating in on-the-land activities, therefore the observed increase in PLB registration is likely influenced by uptake by fish harvesters or others who have directly or indirectly heard about PLBs through the PLB campaign. This interpretation is also supported by information from the NL-FHSA, indicating that the number of PLBs distributed through the program is broadly consistent with the observed increase in registrations, and that devices distributed through the program were required to be registered during the time of purchase.

Overall, these findings indicate a progression toward sustained PLB use among fish harvesters over time.

5 Conclusion and Recommendations

The results of this study suggest that the PLB campaign was effective in reaching fish harvesters and was associated with increased PLB uptake and use among NL fish harvesters. However, improving adoption alone is not sufficient, and further efforts are needed to ensure that fish harvesters know how to properly operate a PLB in an emergency.

Based on these findings, the following recommendations are proposed:

- While the NL-FHSA has shared additional educational material on the use and operation of PLBs throughout the duration of the intervention, it is recommended that promoting PLBs or other safety equipment should be supplemented by educational material and the education should be ongoing.
- If the cost-share program cannot continue, efforts should be made to educate fish harvesters on the cost-benefit of a PLB and provide information on where they can be purchased. In addition, engaging local retailers to improve PLB availability and visibility may further support access and uptake.
- Future intervention should focus on long-term use, reinforcing PLB carriage, proper maintenance, and familiarization with proper operation.

In conclusion, our results indicate that the PLB campaign was an effective intervention for improving PLB uptake and use. Efforts need to continue to ensure sustained uptake and proper use of PLBs by fish harvesters.

6 Acknowledgements

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7 References

- Food and Agriculture Organization of United Nations. (2024). *Committee on Fisheries, Safety at Sea and Decent Work in Fisheries and Aquaculture: Executive Summary*. FAO. <https://openknowledge.fao.org/server/api/core/bitstreams/82a5f03f-2672-49ce-a27c-be960ba9a1c7/content>
- International Labour Organization. (2023, April 28). *Nearly 3 million people die from work-related accidents and diseases*. <https://www.ilo.org/resource/news/nearly-3-million-people-die-work-related-accidents-and-diseases>
- International Labour Organisation. Sectoral Activities Programme. (2000). *Note on the proceedings : Tripartite Meeting on Safety and Health in the Fishing Industry, Geneva, 13-17 December 1999 /*.

- Jensen, O. C., Petursdottir, G., Holmen, I., Abrahamsen, A., & Lincoln, J. (2014). A review of fatal accident incidence rate trends in fishing. *International Maritime Health*, 65(2), 47–52. <https://doi.org/10.5603/IMH.2014.0011>
- Lincoln, J. M., & Lucas, D. L. (2010). *Fatal occupational injuries in the U.S. commercial fishing industry: Risk factors and recommendations (East Coast region)*. National Institute for Occupational Safety and Health (NIOSH).
- Petursdottir, G., Hannibalsson, O., & Turner, J.M.M. (2001). *Safety at sea as an integral part of fisheries management* (No. 966). Rome: FAO Fisheries Circular.
- Qualtrics. (2024). *Qualtrics XM Platform* [Computer software]. Qualtrics. <http://www.qualtrics.com>
- Transportation Safety Board [TSB]. (2022). *Commercial Fishing Safety Watchlist 2022*. Ottawa, Canada. Retrieved from <https://www.tsb.gc.ca/eng/surveillance-watchlist/marine/2022/marine-01.html#>
- Transportation Safety Board [TSB]. (2012). *Marine Investigation Report : Safety Issues Investigation into Fishing Safety in Canada* (No. M09Z0001). Ottawa, Canada. Retrieved from <https://www.tsb.gc.ca/eng/rapports-reports/marine/etudes-studies/m09z0001/m09z0001.pdf>.
- Transportation Safety Board [TSB]. (2019). *Statistical Summary : Marine Transportation Occurrences in 2018*. Ottawa, Canada. Retrieved from <https://www.tsb.gc.ca/eng/stats/marine/2018/ssm-ssmo-2018.pdf>.
- Willis, S., Bygvraa, D. A., Hoque, M. S., Klein, E. S., Kucukyildiz, C., Westwood-Booth, J., & Holliday, E. (2023). The human cost of global fishing. *Marine Policy*, 148, 105440. <https://doi.org/10.1016/j.marpol.2022.105440>

