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EFFECTS OF ADAPTING HARVEST CONTROLS FOR THE INSHORE LOBSTER FISHERY IN THE MARITIMES REGION

CONTEXT

The Maritimes Region Fisheries Management Branch requested advice on the potential effects of adjusting management measures—such as changes to legal-size limits, effort controls, or season timing—on stock productivity and fishery landings within the Maritimes Region inshore lobster fishery.

This Science Advisory Report is from the regional peer review of March 24–25, 2026, on Effects of Adapting Harvest Strategies for the Inshore Lobster Fishery in the Maritimes Region. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

SUMMARY

- Lobster fisheries in the Maritimes Region are socio-economically and culturally important. Harvest controls (HCs) are essential tools for preventing overfishing, supporting sustainability, and maintaining ecosystem function, even though stock recruitment relationships are weak or uncertain.
- All LFAs have experienced rising productivity over the past 25 years followed by declines in some areas. Changes to biology, ecosystems, and fisheries, highlight the need to understand and evaluate HCs.
- Season length is one of the most effective effort controls—shortening seasons, especially at the end, reliably reduces exploitation, injury, and incidental mortality.
- Season timing is less predictable as a management tool because temperature strongly influences catchability. Shifting effort into cooler periods and/or away from post-moult timing likely decreases exploitation.
- Minimum legal size (MLS) and window protections are fast-acting biological controls and increase egg production quickly. MLS relies on new recruits, and neither accumulates spawning stock biomass (SSB).
- Strategically chosen maximum size limits and v-notching programs are slow acting measures that protect large, highly fecund females (and in the case of maximum size limits, large males) thus contributing to accumulation of SSB.
- Handling impacts—particularly on soft-shelled, undersized, and egg-bearing lobsters—are major contributors to unaccounted mortality and must be considered in gear and season decisions.
- Escape vent optimization can substantially reduce handling of undersized lobsters without reducing commercial landings.

- Industry-supported v-notching programs with clearly defined retention rules that meet conservation objectives to protect lobsters through multiple moults are effective for increasing long-term egg production.
- No single harvest control measure can achieve all objectives; a combined strategy using both fast-acting and slow-acting biological measures, plus targeted effort controls, is more likely to confer long-term resilience. Successful implementation depends on aligning these measures with LFA-specific biological realities and fishery operations.
- Many HCs are aimed at increasing egg production. Given the lag between egg production and recruitment to the fishery, it will take a minimum of seven years to realize the benefits in fishery recruits. Egg production benefits from exploitation reduction will similarly take time to realize.
- Effort-based HCs can reduce fishing mortality, leaving more lobster in the water, and should contribute to SSB when they are implemented.

BACKGROUND

Harvest Controls and Fisheries Management

Harvest controls (HCs) on fisheries are essential to prevent overfishing (Sissenwine et al. 2014), improve the likelihood of long-term sustainability (FAO 2020), and maintain broader ecosystem function (Nilsson et al 2019). HCs can also support economic stability and community livelihoods and are required to meet legal, policy, and international obligations. Ultimately, setting harvest at sustainable levels helps manage risk and uncertainty—especially during periods of ecological and socio-economic change (e.g., Free et al. 2023).

Lobster fisheries are a cornerstone of coastal communities across the DFO Maritimes Region, both culturally and socio-economically. Given reported changes in climate and ecosystems (Lotze et al. 2022), shifts in lobster biology and life history (Cook et al. 2023), and changes in fishery dynamics (Pourfaraj et al. 2022), a need for adaptations in management strategies may arise. A data-driven evaluation of the potential impacts of HCs is key to supporting biological sustainability objectives for these fisheries.

This review focuses on Lobster Fishing Areas (LFAs) 27–38 in the Maritimes Region by compiling information from the literature, available data sources, and an Expert Input Survey (EIS). Current HCs (effort and biological controls) and key biological characteristics relevant to HCs are summarized and a data-driven- approach is applied to evaluate potential impacts of changing HCs on exploitation and spawning stock biomass (SSB; egg production). The supporting materials and complete analyses forming the basis of this review are documented in Cook et al 2026 (In Prep[1].).

Each LFA has operated under a distinct range of HCs and all areas have seen dramatic increases in productivity in the past 25 years (Cook et al. 2020, 2023; Figure 1). Since reaching historical highs, declines have been observed in many LFAs. An understanding of HCs and how they contribute to increased egg production is essential to support long-term sustainability of these fisheries.

[1] Cook, A.M., Zisserson, B.M., Montreuil, C., Denton, C., and Element, G. In prep. Application of a Data Driven Approach to Evaluate Harvest Control Rules in Lobster Fisheries. DFO Can. Sci. Advis. Sec. Res. Doc.

It is important to note that increasing SSB will not lead to increases in fisheries recruitment in the short term (less than 7 years) given the time lag between larval stages and mature lobster. The relatively weak stock recruitment relationships (SRRs) suggest ecosystem drivers may be important components of lobster productivity (Shank et al. 2024). That said, maintaining SSB will confer resilience in the long-term as a consistent output of larvae will be able to take advantage of good conditions when they occur.

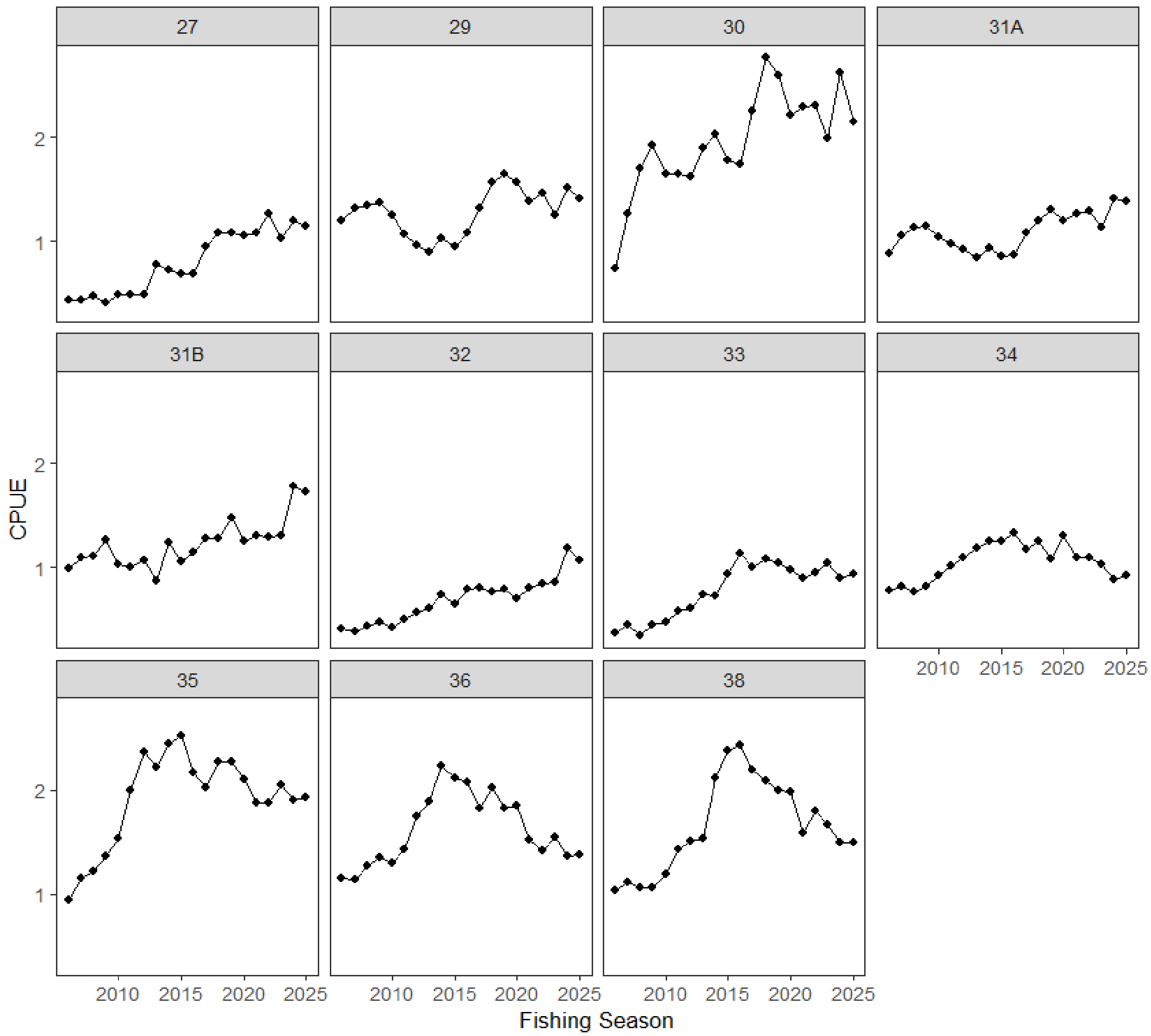

Figure 1. Catch per unit effort (CPUE, kilogram/trap haul) for commercial lobster fisheries in the DFO Maritimes Region by Lobster Fishing Area. Catch rates have not been corrected for soak time, bait type, etc. Fishing seasons spanning calendar years are denoted by year ending.

Lobster Life History

American Lobster (*Homarus americanus*) is an iteroparous decapod crustacean with a complex life cycle that includes external brooded eggs, pelagic larval, and benthic phases for both juvenile and adult. Growth in lobster occurs only through moulting (ecdysis). Immediately following ecdysis, lobsters are soft-shelled and are highly vulnerable to injury or mortality until their new shell hardens. Shortly after moulting, soft-shelled lobsters forage aggressively making them susceptible to trapping but also handling mortality and other types of injury due to having a less durable carapace.

Mature females generally moult every second year (less frequently at larger sizes) while males typically moult annually. Females mate immediately after moulting, usually between June and September. Females store sperm for up to a year while ovaries ripen. Eggs are then extruded, fertilized, and carried under the female's abdomen for an additional 9–12 months before the larvae are released into the water column. Fecundity rises sharply with body size, meaning that large females produce exponentially more eggs (Campbell and Robinson 1983, Estrella and Cadrin 1995). Multiparous females produce eggs with higher energy reserves, which may improve larval survival (Attard and Hudon 1987).

An important consideration when assessing a lobster population's reproductive potential is also the size at maturity (SaM), the size at which 50% of females are sexually mature. This is strongly temperature dependent and varies by LFA (Aiken and Waddy 1980, Campbell and Robinson 1983, Comeau and Savoie 2002). Warmer regions typically exhibit smaller SaM, whereas cooler regions such as the Bay of Fundy show larger SaM (Le Bris et al. 2017). Over recent decades, SaM has trended downward across much of the species' range. Where minimum legal size (MLS) exceeds SaM, most females spawn at least once before entering the fishery; where SaM exceeds MLS, the opposite occurs, reducing the proportion of females contributing to SSB before harvest.

HARVEST CONTROLS ASSESSMENT

HCs in the Maritimes Region lobster fishery fall broadly into two categories: effort-based controls and biological controls. Both categories contribute to managing exploitation, supporting the maintenance of SSB, and improving long-term stock resilience. Because absolute fishing mortality (F) is difficult to estimate in lobster fisheries and environmental variability strongly influences population dynamics, HCs are most effectively assessed in comparative, risk-based terms. Effort-based controls define the upper bound of potential fishing effort in each LFA by shaping the intensity and temporal distribution of fishing pressure and providing protection to the overall stock, a component of which will contribute to SSB. Biological controls protect mature components of the lobster stock and make direct contributions to the SSB.

When biomass or fishery indicators (catch rate, landings, etc.) decline, HCs can help reduce short-term exploitation, and/or protect a component of the spawning stock, to support stock rebuilding by leaving more animals in the population to grow and reproduce.

Previous methods for evaluating HCs for Maritimes lobster fisheries (Cook et al. 2020) were not used here due to uncertainties in estimates of exploitation. Simpler, data driven, simulation models were used to provide evaluation of HCs in this review (Cook et al. In Prep.[1]).

Effort Restrictions

Trap Limits

Trap limits are the basis of effort-control measures in Maritimes lobster fisheries, setting a maximum number of traps per licence (with capped licence numbers within an LFA), based largely on historical fishing practices rather than current biological or economic optimization of effort. While a theoretical maximum effort can be calculated from licences and trap allocations, actual fishing effort is often lower due to partnerships and stacking (where two commercial licences have 1.5 times the normal single trap allotment) and practical constraints like weather.

Importantly, these reductions are often temporary—meaning unused (“latent”) effort can return. In the Maritimes Region there are very few inactive licences.

Reducing trap limits is sometimes proposed to lower exploitation, but small reductions are unlikely to have a meaningful impact. Lobster fisheries are strongly influenced by within-season depletion, where catch rates decline as legal-sized lobsters are removed. In this context, reducing traps may slow the rate of depletion, but may not actually reduce total removals across the entire season, especially if harvesters can compensate with increased efficiency. Additionally, research shows diminishing returns as traps compete with each other, meaning not all deployed traps contribute equally to catch. For trap reductions to significantly affect exploitation, they must be substantial to overcome these dynamics—though such changes would also carry important economic and operational implications. Overall, the effectiveness of trap limits depends on their scale and must be considered alongside harvester behaviour and local fishery conditions.

Season Length and Timing

Season length and timing are longstanding effort controls in Maritimes Region lobster fisheries, but they are not always aligned with key biological processes. Some season structures are intentionally designed around lobster biology—such as avoiding periods of peak moulting—yet many others reflect historical practices, operational constraints, or market considerations. As a result, season timing varies widely among LFAs and must be interpreted within their specific biological and operational contexts. Although lobster fisheries have operated successfully in every season of the year, general guidance can still be provided when evaluating or proposing season changes.

Season length reductions are one of the most direct mechanisms to reduce exploitation and incidental mortality. Because fishing seasons do not end with empty traps, shortening the season will generally reduce total removals and increase the number of lobsters available to contribute to SSB. The effectiveness of this measure depends on the number of actual fishing days removed and when they occur within the season. Reductions at the end of the season are likely more effective (and predictable), as they prevent the harvest of remaining legal-sized lobsters and reduce injury and mortality, particularly with the higher proportion of non-retained individuals (under size and egg-bearing) observed at the end of seasons.

Small adjustments of season timing are unlikely to meaningfully reduce exploitation. Season shifts toward warmer temperatures and/or post-moult conditions can increase exploitation. Shifting effort into colder periods and/or away from post-moult timing can decrease exploitation.

A consideration for setting or adjusting seasons is that fishery mortality extends beyond landed catch. A large proportion of lobsters captured in traps are not retained, including undersized individuals and egg-bearing females. Capture and handling can result in injury and mortality, particularly for pre-moult, post-moult, and soft-shelled lobsters along with stress and egg loss. As the season progresses and legal-sized lobsters are depleted, the proportion of non-retained catch increases, amplifying these incidental impacts. These sources of unaccounted mortality reduce stock productivity.

The effectiveness of season changes varies among LFAs. In shorter, high-intensity spring fisheries (LFAs 27–32), fishing days are already maximized with weather generally being the only limiting factor, so reducing season length directly reduces effort; removing days at the end of the season is most effective. In longer fisheries (LFAs 33–38), effort is influenced by both depletion and seasonal temperature changes, including periods of reduced fishing during cooler winter months. In these systems, shortening the season may not proportionally reduce fishing effort, as harvesters may reallocate effort to traditionally less productive periods. However, end-of-season reductions remain the most predictable means of lowering exploitation.

Season timing also affects lobster quality and fishery value. Harvesting during or shortly after moulting results in lower meat yield, higher handling mortality, and reduced market value. Adjusting seasons to avoid these periods can improve product quality and reduce waste, though optimal timing remains LFA-specific.

Overall, season length is a more effective and predictable tool than season timing for reducing exploitation. The most predictable benefits are achieved through end-of-season reductions, though outcomes depend on LFA-specific dynamics, harvester behaviour, and environmental conditions. Season adjustments should be evaluated in the context of total (landed and incidental) mortality and stock productivity.

A summary of effort-based HCs is shown in Table 1.

Table 1. Summary table of potential benefits of effort-based restrictions.

Harvest Control Rule	Potential Benefits	Considerations	Operational Considerations
Trap Reduction	Lower exploitation	• Substantial reduction in traps to realize benefit • Assumes fishing practices remain the same, e.g. remaining traps are not hauled more frequently	• Reduces costs (bait, traps, etc.) • Reduces time required to haul traps
Reduce Season	Lower exploitation	• Benefit more predictable at end of season	• In LFAs 27-32, it removes the lowest CPUE (least efficient) portion of the season • In LFAs 33-38, it removes a portion of the season with low (relative to start of season) CPUE
Reduce Season	Improve quality of catch	• Avoid portion(s) of season with soft or poor condition lobster	• End of season for LFAs 27-32 • Start of season for LFAs 33-38
Reduce Season	Reduce handling of egg-bearing females	• Avoid time frame when egg-bearing females are most susceptible to egg loss—immediately after extrusion or immediately before egg release. • Reduce overall stress on egg-bearing lobsters which can lead to clutch reductions	• Reduce female handling during mid-June to September • Improves overall efficiency and lowers total removals from the stock by protecting egg-bearing females from handling damage or mortality
Reduce Season	Reduce handling of undersize	• Remove the portion of the season where under-size proportion of the catch is the highest	• Improves onboard efficiency
Shift Season	Lower exploitation	• Only effective if moving from warmer water season to colder	• Lowers exploitation by lowering capture efficiency
Shift Season	Improve quality of catch	• Avoid portion(s) of season with soft or poor condition lobsters if shifting away from moult or post-moult period to pre-moult	• Shifting away from mid-June to late November. • Consideration of annual and local variability
Shift Season	Reduce handling of egg-bearing females	• Avoid time frame when egg-bearing females are most susceptible to egg loss—immediately after extrusion or immediately before egg release. • Reduce overall stress on egg-bearing lobsters which can lead to clutch reductions	• Reduce female handling during mid-June to September • Improves overall efficiency and lowers total removals from the stock by protecting egg-bearing females from handling damage or mortality

Biological Restrictions

Biological HCs are central to protecting SSB in lobster fisheries and primarily consist of size-based measures and reproductive protections. These include MLS, maximum size limits, window sizes of prohibited retention, v-notching programs, and the existing protection of reproductive females through mandatory release of egg-bearing individuals. With the exception of MLS, most of these measures focus exclusively on females, reflecting the assumption that males are not generally limiting to reproduction, supported by current sex-ratios. Note that an increasing body of literature (e.g. Tang et al. 2019) indicates this may not always hold true, thus monitoring programs should track size structure and sex ratio in all areas where female-centric measures are considered and employed. Broadly, biological HCs can be categorized as either fast-acting, which yield immediate increases in egg production with limited long-term accumulation of SSB, or slow-acting, which yield gradual increases that promote long-term accumulation of SSB and confer stock resilience. With the exception of maximum size limits, lobsters will grow out of their protected status and become available to the fishery in the future, ultimately minimizing impact on exploitation.

MLS is the most widely applied and historically established measure. It functions as a fast-acting HC allowing an increased proportion of females to reproduce before entering the fishery. MLS protects large numbers of individuals as they are protected prior to entry to the fishery, but relies on a constant supply of new recruits. In the Maritimes Region, current MLS values allow between 21% and 87% of females to reach maturity prior to capture based on current size at maturity estimates. While increasing MLS increases egg production quickly following implementation, it primarily protects small, first-time spawners and does not result in long-term accumulation of SSB, as individuals are available to the fishery typically after one additional moult.

Window size regulations which protect lobsters within a defined size range—typically mature females—to increase egg production also represent a fast-acting approach. However, because lobsters grow out of the protected size range these measures do not contribute to long-term SSB accumulation. Depending on the size of the window, they could grow out of the protected size range after as few as one moult. Their effectiveness depends on ensuring the protected size range corresponds to fully mature individuals within that LFA, and is represented in the catch.

In contrast, maximum size limits are a slow-acting HC that promote the accumulation of large, highly fecund individuals within the SSB. Although immediate benefits are limited due to the relatively small proportion of large lobsters in the population, long-term gains arise as these individuals contribute disproportionately to egg production over multiple years. The effectiveness of this measure depends on protecting both sexes and the size is set such that sufficient animals survive to be represented in the catch, as large females require large males for successful mating; current measures that focus only on females may limit overall effectiveness.

Implementation of a v-notching program is another slow-acting measure that can significantly enhance long-term reproductive output. This measure provides protection of females across multiple spawning cycles by way of v-notching the flipper. Its effectiveness, however, is highly dependent on implementation. To effect change to overall stock reproductive potential, v-notches must be applied to a significant portion of all egg-bearing females encountered in commercial fisheries. This effort, combined with a clearly defined retention rule that meets the conservation objectives of SSB accumulation (i.e., protection across multiple moults), represents one of the most effective mechanisms for increasing long-term egg production.

Overall, fast-acting HCs (e.g., MLS, window sizes) provide immediate increases in egg production, but may not confer resilience as there is no longer term accumulation of SSB, while slow-acting HCs (e.g., maximum size, v-notching programs) support long-term SSB growth and stock resilience. The most effective management strategies will likely involve a combination of both approaches, with particular emphasis on consistent implementation and alignment with lobster life history and fishery dynamics. A summary of biological-based HCs is shown in Table 2.

Table 2. Summary table of potential benefits of biological restrictions under the evaluated harvest controls that contribute to reduced exploitation (SSB–spawning stock biomass, SaM–size at maturity).

Harvest control	Time frame for expected increased egg production	Result in a long-term accumulation of SSB	Risks	Number of Additional Clutches	Effects on Exploitation	Considerations
Minimum Legal Size (MLS)	Year +1	No	Reliant on incoming recruitment.	1 for most areas. Differences in SaM and MLS >15 mm could be 2.	Short-term delay. Lost landings in year 1 will be made up via growth following a moult.	None, same on board process. Consider adjustments to escape vent size
Window Measure	Year +1	No	Reliant on recruitment. May become male-limiting	Dependent on size of window. Typically 1	Short-term delay. Lost landings from window sizes, available the following moult	2 extra gauges for window. Slows handling.
Maximum Size	Minimal in Year+1, increases over time	Yes	Not applicable	6+	Removal. Loss of large lobster to the fishery, their value in egg production is high	1 extra gauge. Will also decrease exploitation Dependent on representation in catch
V-notching egg-bearing	Year+1, Year 2 and beyond	Yes, given appropriate definition.	Difficult to enforce compliance. May become male-limiting	3 with the conservative definition.	Medium-term delay. Reduction, larger lobsters return to the fishery	V-notch pliers. Difficult to monitor compliance

ADDITIONAL CONSIDERATIONS

Connectivity

When considering LFA-specific HCs, it is important to recognize that LFAs are management units, not biological units. This means that the potential benefits of introduced HCs may extend beyond the boundaries of the LFA(s) where they are applied. This enriches neighbouring LFAs' lobster populations, but might also dilute the potential benefits within the LFA where changes in management measures were introduced. Coherence in HC implementation across management units would be beneficial—especially for measures intended to result in an accumulation of SSB—because it is counterproductive for one area to harvest lobsters that are protected in adjacent areas.

Escape Vents

Current regulations require that lobster traps have a single escape vent to allow undersized lobsters to exit traps while still on the sea floor, thereby reducing their exposure to handling stress and injury during hauling and onboard sorting as well as harmful interactions with other lobsters in the trap. Escape vent optimization represents a practical and effective means of reducing incidental impacts on undersized lobsters (including egg-bearing females) while maintaining commercial performance. There should be an explicit link between MLS and vent size/configuration.

DFO's multi-year escape vent study shows that the current Maritimes requirement of a single 44 mm vent is insufficient for optimizing undersized escapement. Increasing vent size and adding a second vent substantially reduces the handling of undersized lobsters without negatively impacting commercial catches. For LFAs with an 82.5 mm MLS, 47 mm (1 7/8") vents reduce undersized catch appreciably without impacting commercial landings. For an 84 mm MLS, the optimum vent size appears to be 49 mm (1 15/16"). Adding additional vents of the same size further reduces undersized catch.

V-Notch Definition

As previously discussed, v-notching programs have been shown to protect mature female lobsters. However, within the DFO Maritimes Region, two distinct definitions of what constitutes a non-retainable notched lobster exist, one that allows for retention if setal hairs have grown across the notch and another that requires there be no visible mark or mutilation (regardless of setal hairs) for the lobster to be legally retained. The definition that considers presence of setal hairs is less restrictive and not consistent with the conservation objectives of a v-notching program to protect females across multiple moults (DeAngelis et al. 2010).

SOURCES OF UNCERTAINTY

Only input and biological HCs have been considered in this exercise. Output HCs such as quotas, which are not currently in use in the Maritimes Region inshore lobster fisheries, were not explored. Evaluation of HCs for lobster stocks involves multiple sources of uncertainty that influence both the identification and interpretation of biological processes derived from available data, as well as management outcomes. These uncertainties arise from limitations in available data, the dynamic nature of lobster biology and environmental conditions, and the challenges inherent in evaluating a fishery without a formal stock assessment model. Despite these uncertainties, this data-driven comparative approach provides a pragmatic and scientifically defensible framework for evaluating the relative performance of HCs.

Much of the data informing biological parameters (length frequency, sex ratio, etc.) arises from at-sea sampling which may not always be completely representative of the commercial fishery or the population. Growth rates are based on potentially outdated growth transition matrices from the 1980s-1990s. Similarly, fecundity estimates, though updated for clutch fullness, are based on work conducted in the 1980s.

Lobster growth, fecundity, movement, and catchability are all strongly influenced by bottom temperature. As such, accurately predicting performance of HCs is difficult in the face of changing temperature fields and their effects on many aspects of lobster biology. Further, the absence of robust SRRs limits the ability to project long-term outcomes. As a result, improvements in egg production may not translate directly into increased recruitment.

CONCLUSIONS AND ADVICE

Summary

This review demonstrates that no single HC can achieve all management objectives across the Maritimes Region; rather, an effective strategy requires a complementary suite of measures. Biological controls fall into two functional categories. Fast-acting measures, such as increases to MLS and the application of window sizes, provide immediate gains in egg production because a large proportion of lobsters occur near existing size thresholds. However, these benefits may be short-lived, as protection is possibly as short as one moult cycle and does not result in accumulation of SSB. In contrast, slow-acting measures, including maximum size limits and v--notching, protect large and/or multiparous females (and potentially large males) across multiple moults, supporting gradual SSB accumulation and enhancing long-term stability.

Effort-based controls can also influence exploitation when applied at sufficient scale. Shortening fishing seasons—particularly by removing days at the end—reduces total removals and lowers interactions with undersized and egg-bearing lobsters. Reductions in trap limits must be substantial to meaningfully effect desired outcomes; modest reductions may only slow the rate of depletion without reducing overall removals.

Recent declines in the proportion of large lobsters in some LFAs underscore the importance of carefully calibrating maximum size thresholds and regularly updating size distribution data. The effectiveness of v-notching egg-bearing females is also highly dependent on compliance and regulatory definition. Broader definitions that protect all visibly notched females—regardless of setal hair regrowth—extend protection across multiple moults, whereas narrower definitions substantially limit benefits. Given connectivity among LFAs through larval transport and adult movement, coordinated implementation of SSB-building measures can enhance regional outcomes and reduce the risk of cross-boundary erosion. Finally, optimizing escape vent design provides an additional gear-based approach to reduce interactions with undersized lobsters without compromising commercial landings.

Environmental conditions, particularly bottom temperature, play a key role in the effectiveness of these HCs. Temperature strongly influences lobster movement, catchability, and moulting cycles, thereby affecting the realized impact of any HC. Shifting fishing effort into warmer periods tends to increase exploitation, while shifting into cooler periods can moderate removals. Although SRRs remain weak and spatially variable, the most risk-averse strategy is to maintain high and stable egg production while progressively building SSB through protection of large, multiparous females (while ensuring adequate large males exist). Coupling these biological protections with targeted effort controls—primarily season-end reductions where needed—and gear optimization provides a balanced, risk-aware path.

Practical Management Advice

Application of a portfolio of HCs that matches stock trajectory, local biology, and fishery behaviour is advised.

If productivity is declining/immediate action required: Emphasize fast-acting measures to generate immediate gains in egg production—such as increasing MLS and/or implementing an LFA-specific window aligned with local maturity patterns. Reduce exploitation by avoiding shifting fishing effort into warmer periods and post-moult periods where catchability increases. Additionally, increase survivorship of the non-retained catch by avoiding harvesting during pre- and post-moult periods. Where effort reductions are needed, prioritize removing days at the end of the season.

If productivity is stable/building resilience: Introduce measures that support SSB accumulation over time. This includes adopting a v-notching program that meets conservation objectives and implementing strategic maximum size limits—ideally for both females and males in areas where large male availability may be limiting.

If rebuilding following poor recruitment: Maintain fast-acting protections while accelerating the implementation of resilience-building measures. Incremental increases to MLS or expansion of window sizes may be appropriate where spacing between size at maturity and MLS supports clear biological gains; otherwise, priority should be placed on v-notching and maximum size limits to retain multiparous females. Effort reduction measures to reduce exploitation should also be implemented.

Across all scenarios: Evaluate escape vent configurations on MLS-specific basis. When reducing effort, prioritize end-of-season reductions over periodic closures. Avoid season timing changes that increase catchability and associated exploitation.

Implementation Considerations

Successful implementation depends on aligning these measures with LFA-specific biological realities, and fishery operations.

Calibration by LFA: Align MLS and window size-bounds with updated size-at-maturity (SaM) ogives and current catch size distributions. Maximum size thresholds should be calibrated using local size structure, including reference points, such as the 90th–99th percentiles and observed trends in the abundance of large lobsters of both sexes.

Compliance and definitions: For v-notching, adopt clear and stringent definitions that prohibit retention of any visibly marked female, regardless of setal hair regrowth. Provide simple, standardized dockside guidance to support consistent identification and enforcement.

Equity and connectivity: Coordinate SSB-building measures across adjacent LFAs to reduce the risk of protected lobsters being harvested in neighbouring areas. Clearly communicate the expected cross-boundary and long-term benefits to harvesters to support uptake and compliance.

Quality and handling: Avoid peak soft-shell or pre-moult periods when setting or adjusting seasons to minimize quality loss and mortality. Promote best handling practices to reduce injury and wastage across all size classes, with particular emphasis on post-moult recovery period and egg-bearing lobsters.

Monitoring and Evaluation

Regardless of stock status or the implementation of HCs, it is valuable to adopt an adaptive management cycle supported by predefined indicators across multiple domains. Focused monitoring and research priorities should work to enrich these data sources.

Biological: SSB proxy (egg production), sex-specific length frequency (including 90th/95th/99th percentiles), proportion multiparous, abnormal clutch prevalence, SaM trends.

Fishery: CPUE trajectories, proportion sublegal and egg-bearing in catch, trap interaction metrics, seasonal depletion profiles.

Compliance and best practices: V-notch detection rates, and proper handling.

Environment: Bottom temperature time-series by depth/area, moult timing indicators.

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SOURCES OF INFORMATION

Aiken, D.E., and Waddy, S.L., 1980. Maturity and reproduction in the American lobster. Can. J. Fish. Aquat. Sci. 932:60–71.

Attard, J., and Hudon, C. 1987. Embryonic Development and Energetic Investment in Egg Production in Relation to Size of Female Lobster (*Homarus americanus*). Can. J. Fish. Aquat. Sci. 44(6): 1157–1164. doi:10.1139/f87-138.

Campbell, A., and Robinson, D.G. 1983. Reproductive potential of three American lobster (*Homarus americanus*) stocks in the Canadian Maritimes. Can. J. Fish. Aquat. Sci. 40: 1958-1967.

Comeau, M., and Savoie, F. 2002. Maturity and Reproductive Cycle of the Female American Lobster, *Homarus Americanus*, in the Southern Gulf of St. Lawrence, Canada. J. Crustac. Biol. 22(4): 762–774. doi:10.1163/20021975-99990290.

Cook, A.M., Hubley, P.B., Howse, V., and Denton, C. 2023. 2019 Framework Assessment of American Lobster (*Homarus americanus*) in LFA 34–38. DFO Can. Sci. Advis. Sec. Res. Doc. 2023/075. vii + 158 p.

Cook, A.M., Hubley, P.B., Denton, C., and Howse, V. 2020. 2018 Framework Assessment of American Lobster (*Homarus americanus*) in LFA 27–33. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/017. vi + 251 p.

Estrella, B.T., Cadrin, S.X. 1995. Fecundity of the American Lobster (*Homarus americanus*) on Massachusetts Coastal Waters. ICES Mar. Sci. Symp., 199: 61-72. doi:10.17895/ices.pub.19271378.

FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. doi:10.4060/ca9229en.

Free, C.M., Mangin, T., Wiedenmann, J., Smith, C., McVeigh, H., and Gaines, S.D. 2023. Harvest control rules used in US federal fisheries management and implications for climate resilience. Fish. Fish. 24: 248–262. doi:10.1111/faf.12724.

Le Bris, A., Pershing, A.J., Gaudette, J., Pugh, T.L., and Reardon, K.M. 2017. Multi-scale quantification of the effects of temperature on size at maturity in the American lobster (*Homarus americanus*). Fish. Res. 186 (2017) 397–406. doi:10.1016/j.fishres.2016.09.008.

Lotze, H.K., Mellon, S., Coyne, J., Betts, M., Burchell, M., Fennel, K., Dusseault, M.A., Fuller, S.D., Galbraith, E., Garcia Suarez, L., de Gelleke, L., Golombek, N., Kelly, B., Kuehn, S.D., Oliver, E., MacKinnon, M., Muraoka, W., Predham, I.T.G., Rutherford, K., Shackell, N., Sherwood, O., Sibert, E.C., and Kienast, M. 2022. Long-term ocean and resource dynamics in a hotspot of climate change. FACETS 7: 1142–1184. Canadian Science Publishing. doi:10.1139/facets-2021-0197.

Nilsson, J.A., Johnson, C.R., Fulton, E.A., and Haward, M. 2019. Fisheries sustainability relies on biological understanding, evidence-based management, and conducive industry conditions. ICES J. Mar. Sci. 76(6): 1436–1452. doi:10.1093/icesjms/fsz065.

Pourfaraj, V., Tam, J. C., Parlee, C. E., Campbell-Miller, J., and Cook, A.M. 2022. Process and development of a conceptual model of the social-ecological system for the American Lobster fishery in Maritimes Region. Can. Tech. Rep. Fish. Aquat. Sci. 3510: v + 30 p.

Shank, B., Carloni, J.T., Geoghegan, P., Fields, D.M., Goode, A.G., Walsh, H.J., and Wahle, R.A. 2024. Bridging the spawner-recruit disconnect II: Revealing basin-scale correlations between zooplankton and lobster settlement dynamics in the Gulf of Maine. Fish. Res. 278: 107082. doi:10.1016/j.fishres.2024.107082.

Sissenwine, M.M., Mace, P.M., and Lassen, H.J. 2014. Preventing overfishing: evolving approaches and emerging challenges. ICES J. Mar. Sci. 71(2): 153–156. doi:10.1093/icesjms/fst236.

Tang, F., Sainte-Marie, B., Gaudette, J., and Rochette, R. 2019. Role of gamete limitation in the occurrence of ‘abnormal early clutches’ on female American lobster, *Homarus americanus*, in eastern Canada. Marine Biology 166(11): 1–14. Springer Nature B.V., Heidelberg, Netherlands. doi:10.1007/s00227-019-3585-2.

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