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Canadian Science Advisory Secretariat
Maritimes Region **Science Response 2015/029**

LOBSTER (*HOMARUS AMERICANUS*) OFF SOUTHWEST NOVA SCOTIA (LOBSTER FISHING AREA 34): 2015 STOCK STATUS UPDATE

Context

The status of the lobster resource in Lobster Fishing Area (LFA) 34 to the end of the 2011-12 season (May 31, 2012) was fully assessed in February 2013 (DFO 2013, Tremblay et al. 2013) and was updated in 2014 (DFO 2014). Fisheries Management has requested "interim information on the status of LFA 34 lobster stocks to maintain the scientific basis for management advice consistent with Fisheries and Oceans Canada (DFO) Precautionary Approach (PA)". The 2013 assessment identified three key indicators that capture changes in lobster abundance and proposed reference points for each indicator. This Science Response updates these indicators to the end of the 2013-14 fishing season.

This Science Response Report results from the Science Response Process of June 3, 2015, on the Stock Status Update on American Lobster in Lobster Fishing Area (LFA) 34.

Background

Description of the Fishery

Commercial lobster fishing in LFA 34 (Figure 1), off southwest Nova Scotia currently has the highest landings and the most participants of any LFA in Canada. Landings in LFA 34 began a long-term increase in the 1980s and recent landings are at record highs (Figure 2). This increase in landings occurred in most lobster stocks in the Western Atlantic.

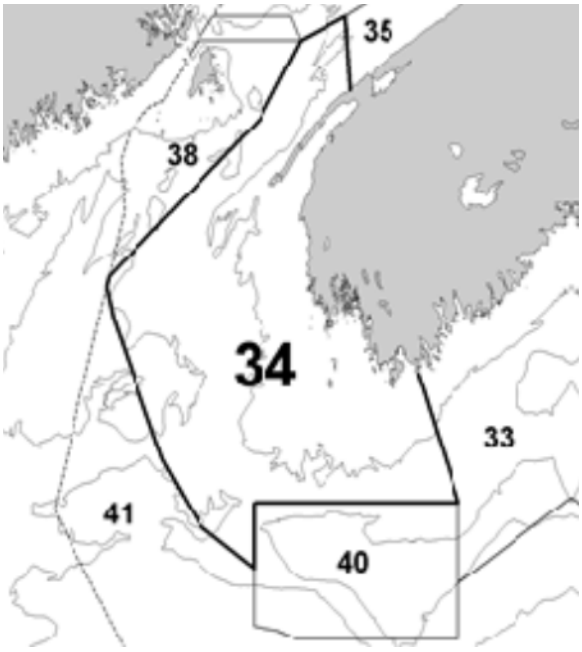

Figure 1. Lobster Fishing Area (LFA) 34 and adjacent LFAs.

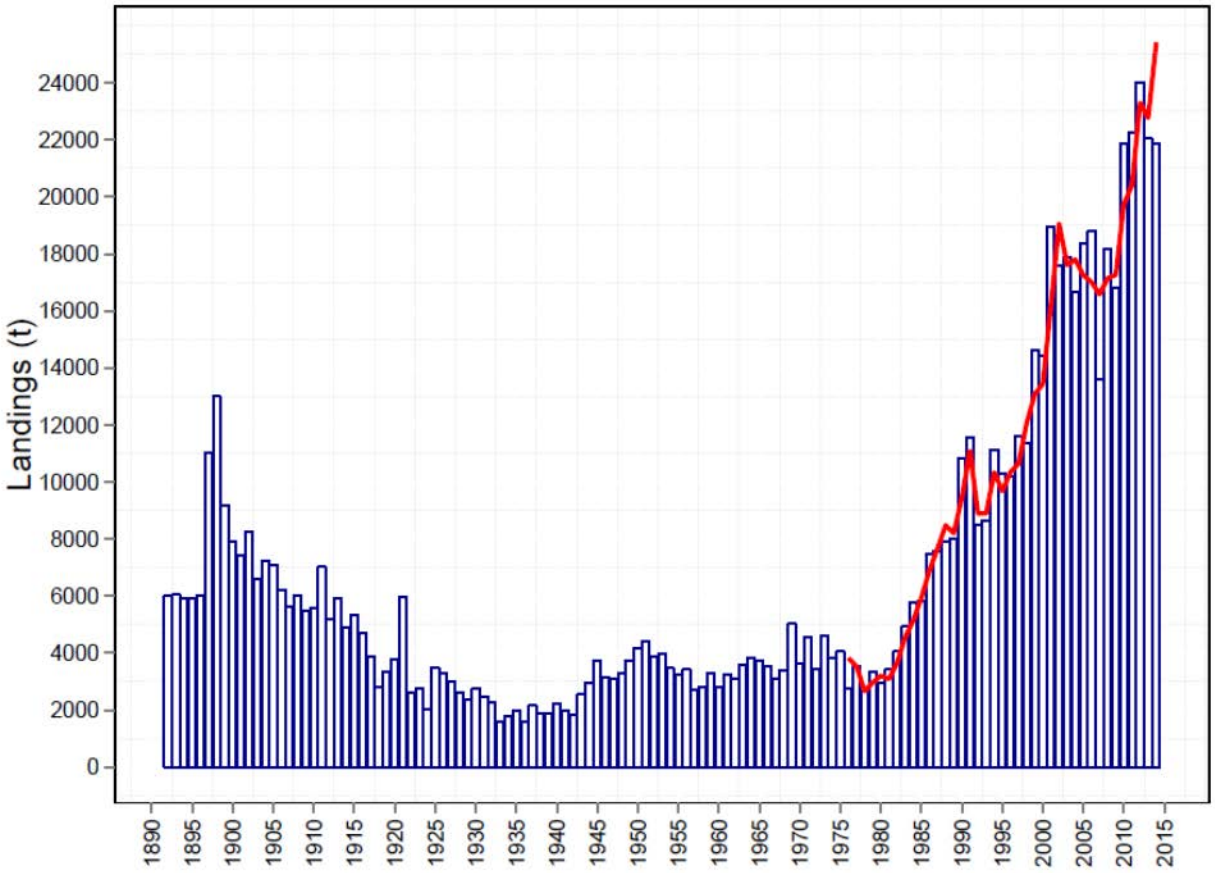

Figure 2. Annual lobster landings by the commercial fishery in LFA 34, 1893 to 2014. The solid line represents seasonal lobster landings, first available for the 1975-76 fishing season (Year 1976 on plot) until the present. The fishing season is from the last Monday in November of one year until May 31st of the following year.

The fishery is managed by input controls including a minimum legal size (82.5 millimetres), prohibition on landing of both egg-bearing and V-notched females, limited entry, a season between the last Monday in November through to May 31st, and a trap limit. Other management measures include the requirement for escape vents to allow escapement of sublegal sizes and biodegradable trap mechanisms to mitigate ghost fishing by lost traps.

Analysis and Response

The 2013 LFA 34 assessment (DFO 2013, Tremblay et al. 2013) provided a full analysis of stock health by describing Fishery Performance and providing indicators for Abundance, Fishing Pressure, and Reproduction. Spatial variation of these indicators was evaluated. Three primary abundance indicators were identified and associated reference points were tabled. The first abundance indicator was based on landings. Landings-based reference points are part of the current Inshore Lobster Integrated Fishery Management Plan for LFAs 27-38. The basis for these was documented at a Maritimes Region Science Advisory Meeting in 2012 (DFO 2012). It was recognized that using landings as the sole indicator of abundance for lobster stocks has risks, and one of the goals of the 2013 assessment (DFO 2013) was to provide potential alternatives. Two additional abundance indicators and associated reference points were proposed. One was based on commercial catch rate calculated as total landings/total trap hauls in LFA 34. The second was based on the mean number of lobsters per tow in a fishery-independent groundfish trawl survey (known as the ITQ survey). This survey is currently in

transition to a lobster-focused survey. The abundance indicators are provided below. All are above the proposed Upper Stock References (USRs); thus, LFA 34 is considered to be in the healthy zone.

Landings and Catch Rate

Landings for 2013-14 are the highest on record (Figure 2, Table 1). The USR for the abundance of legal lobsters based on landings (8,867 metric tonnes (t)) is defined as 80% of the median for the period 1984-85 to 2008-09. The metric for assessing where the stock is relative to the USR is the 3-year running mean of landings. For the season ending 2013-14, this metric is 23,830 t, well above the USR and the highest on record.

The commercial catch-per-unit-effort (CPUE, in kilograms(kg)/trap haul) has increased substantially since 1999-00, and the 2013-14 value is the highest observed. The USR for the abundance of legal size lobsters based on the CPUE (0.62 kg/trap haul) is defined as 80% of the median for the reference period 1998-99 to 2008-09. Again, the measure for assessing where the stock is relative to the USR is the 3-year running mean of the commercial CPUE. The current 3-year running mean is 1.18 kg/trap haul, well above the USR (Figure 3).

Table 1. LFA 34 landings (t) for fishing seasons from 1999-00 to 2013-14, together with 3-yr running mean.

Fishing Season	Landing	Fishing Season	Landings
1999-00	13,444	2007-08	17,145
2000-01	16,198	2008-09	17,262
2001-02	19,058	2009-10	19,749
2002-03	17,613	2010-11	20,401
2003-04	17,801	2011-12	23,295
2004-05	17,250	2012-13	22,770
2005-06	17,009	2013-14	25,425
2006-07	16,583	**3-yr running mean**	**23,830**

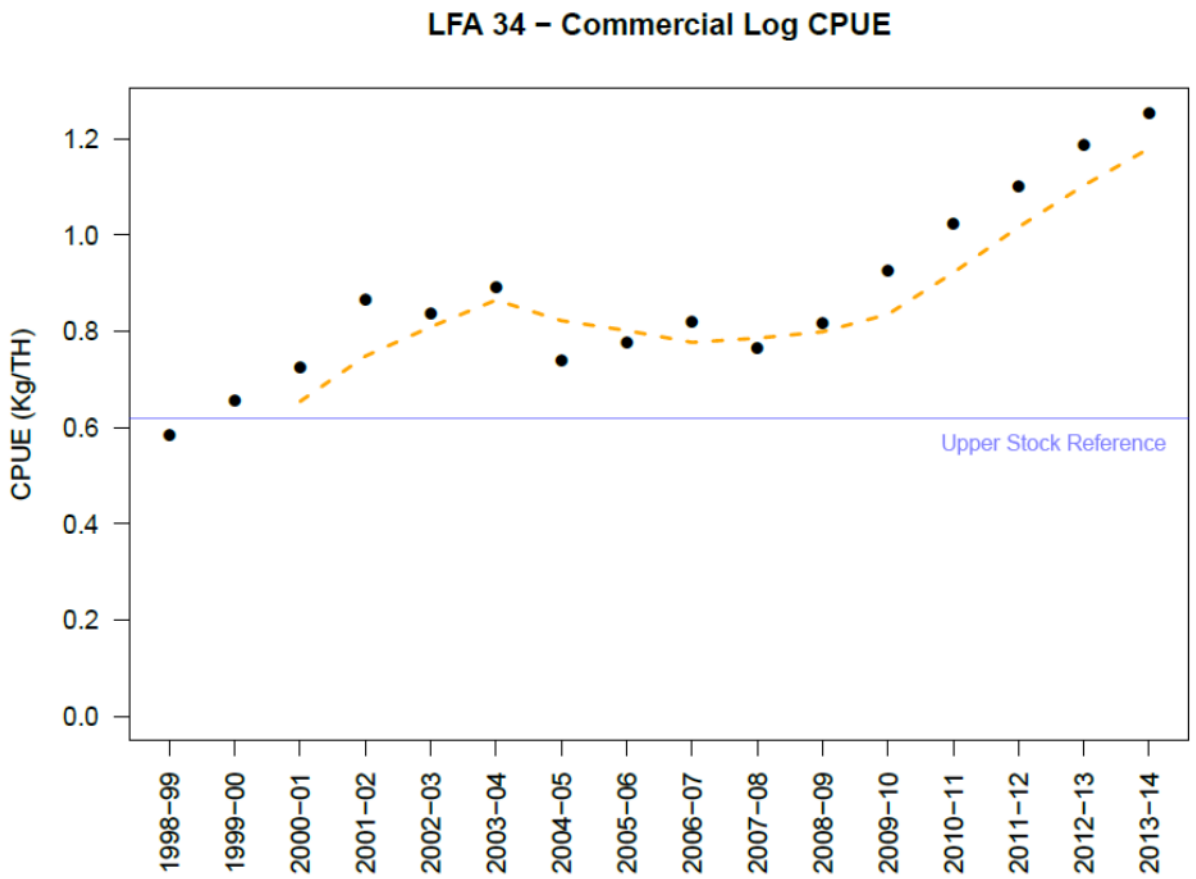

Figure 3. Trend in commercial CPUE (total weight landed/total trap hauls) for available time period together with proposed USR (horizontal line at 0.62 kg/trap haul). USR is based on 80% of the median CPUE from 1998-99 to 2008-09. The dashed line is the 3-year running mean (1.18 after 2013-14 season).

Fishery-Independent Survey

The fishery independent indicator proposed in the last assessment (DFO 2013) was based on the catch rate (number of lobsters/tow) in an existing groundfish trawl survey (ITQ survey). This survey was designed for other species but also sampled lobsters. The proposed USR for total (legal and sublegal) lobster abundance based on this survey was 80% of the median catch rate for the period 1996-2009. As for the previous USRs, it was proposed that the 3-year running mean be used as the metric to assess stock status. Figure 4 shows that the 3-year running mean after the 2014 survey is well above the proposed USR.

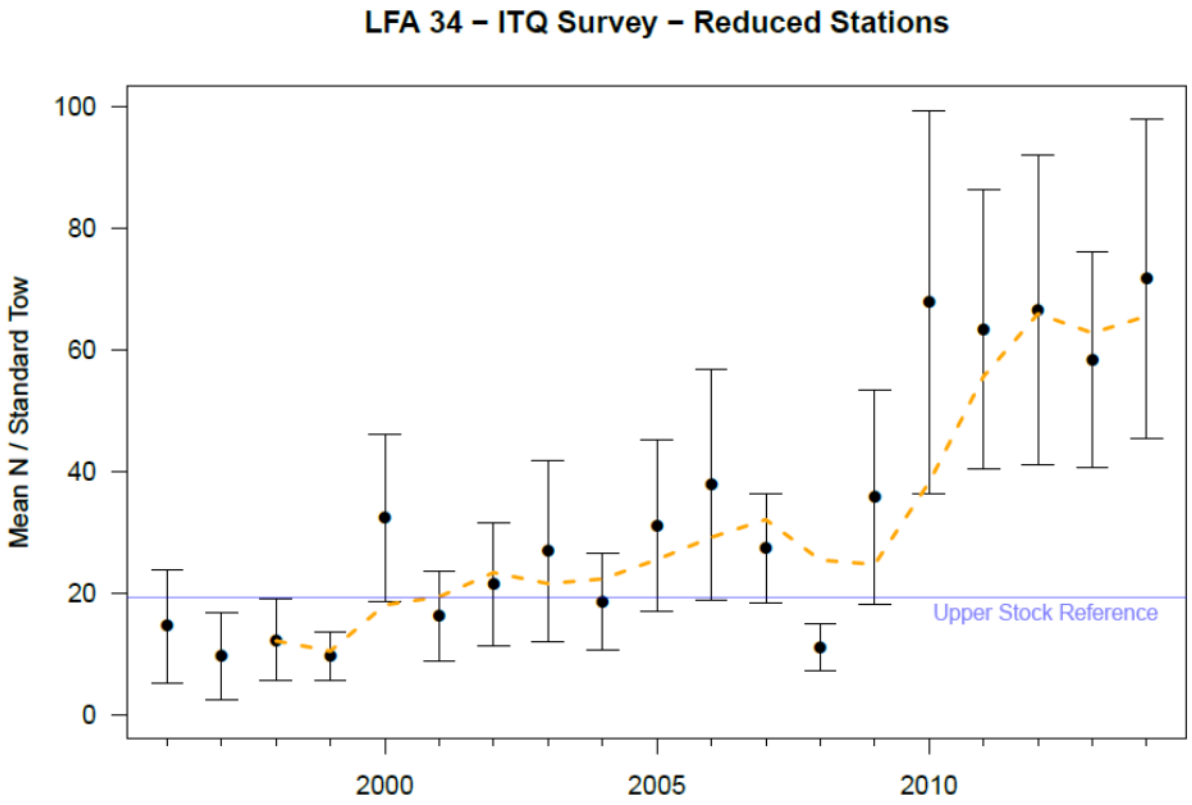

Figure 4. Trend in mean number of lobsters per standard tow from the ITQ survey with a reduced number of stations (n=32) to adjust for changes to survey in 2013. Standard error bars are shown for each year. An adjusted USR (horizontal line at 19.3 lobsters/standard tow) was calculated by taking 80% of the median number per standard tow for the reduced number of stations. The dashed line is the 3-year running mean.

Recent Developments

The numerical values of the fishery independent indicator and USR are sensitive to the stations included in the calculations. In DFO (2013), all stations sampled were included and within-year averages were taken if the same station number was sampled more than once in the survey. In 2013, the ITQ survey began a transition to a lobster-focused survey under the direction of the Maritimes Region's Lobster Unit. Additional stations were sampled in shallower waters, and a substantial number of previously sampled ITQ survey stations in deeper water were not sampled. To account for this change, in DFO (2014) the annual catch rate was calculated for 25 stations that were sampled in 2013 and in at least 14 of 18 years from 1996 to 2013. For the current update a more thorough analysis was completed of station coding and location for the period 1996 to 2014. Adjustment to a standard tow length (1 km) was also completed. This resulted in the inclusion of an additional 7 stations for a total 32 stations that were sampled in 2013 or 2014 and in at least 15 of the 19 years from 1996 to 2014 (Figure 5). The USR was adjusted based on the 32 index stations, by taking 80% of the median from 1996-2009 with the 32 stations. The 3-year running mean based on the reduced number of stations has increased to well above the adjusted USR since 2009 and has remained high since 2012 (Figure 5).

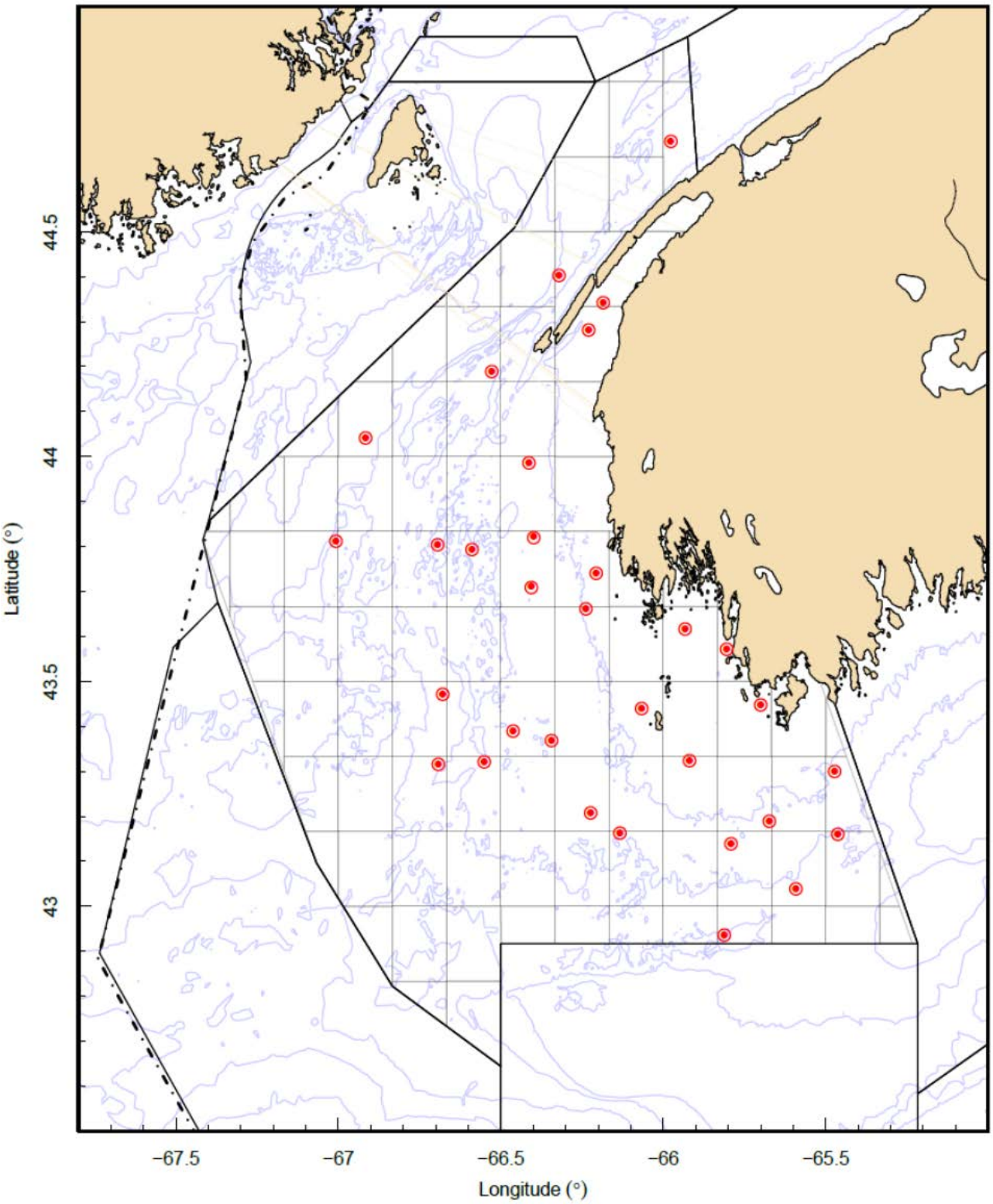

Figure 5. Locations of the 32 index stations from the ITQ survey that were selected based on the criteria of being sampled in 2013 or 2014 and in at least 15 of the 19 years from 1996 to 2014.

Conclusions

The lobster stock in LFA 34 at the end of the 2013-14 season (May 31, 2014) was considered to be in the healthy zone based on three abundance indicators (landings, commercial catch rate and trawl survey catch rate). The 3-year running means of these were well above the proposed USRs.

Each of the abundance indicators have strengths and weaknesses that were outlined in the previous assessment (DFO 2013). Given that all three are providing similar signals, there is confidence that abundance remains high relative to the 1985-2009 period.

With the transition to a new lobster-focused fishery independent survey, there will be changes in survey design and protocols aimed at improved estimates of lobster abundance. These changes will result in uncertainties when making comparisons with previous years.

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Sources of Information

DFO. 2012. Reference Points Consistent with the Precautionary Approach for a Variety of Stocks in the Maritimes Region. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/035.

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