

Sea Urchin Fishery Review



Submitted to:

Mr. Ian Burford, Director Licensing and Quality Assurance
Department of Fisheries and Aquaculture
Government of Newfoundland and Labrador
P.O. Box 8700, 30 Strawberry Marsh Road
St. John's, NL
A1B 4J6

Submitted by:

Pisces Consulting Limited
PO Box 3412
Paradise, NL
A1L 3W4

(902) 482-0984 (o)

(902) 497-4134 (c)

Contact: Peter Norsworthy

pisces@ns.sympatico.ca

www.PiscesConsult.ca

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EXECUTIVE SUMMARY

The purpose of this project is to assess the historic and current situation in the sea urchin sector in NL and to provide guidance to the Department of Fisheries and Aquaculture (DFA) to optimize the performance of this sector. These findings give consideration to both harvesting and processing capacity, effort required to monitor proposed policy changes, and the economic impact of several scenarios.

Industry value may double under the right policy environment: The estimated GDP of activity related to the sea urchin fishery in 2013/14 is a minimum of \$2.0m and maximum of \$2.7m. The maximum GDP that could be realized by the sector, with current processing capacity, is estimated to be \$4.0-\$6.6m. Direct GDP for the fishery comprises 65% of the benefits, and indirect and induced benefits 35%.

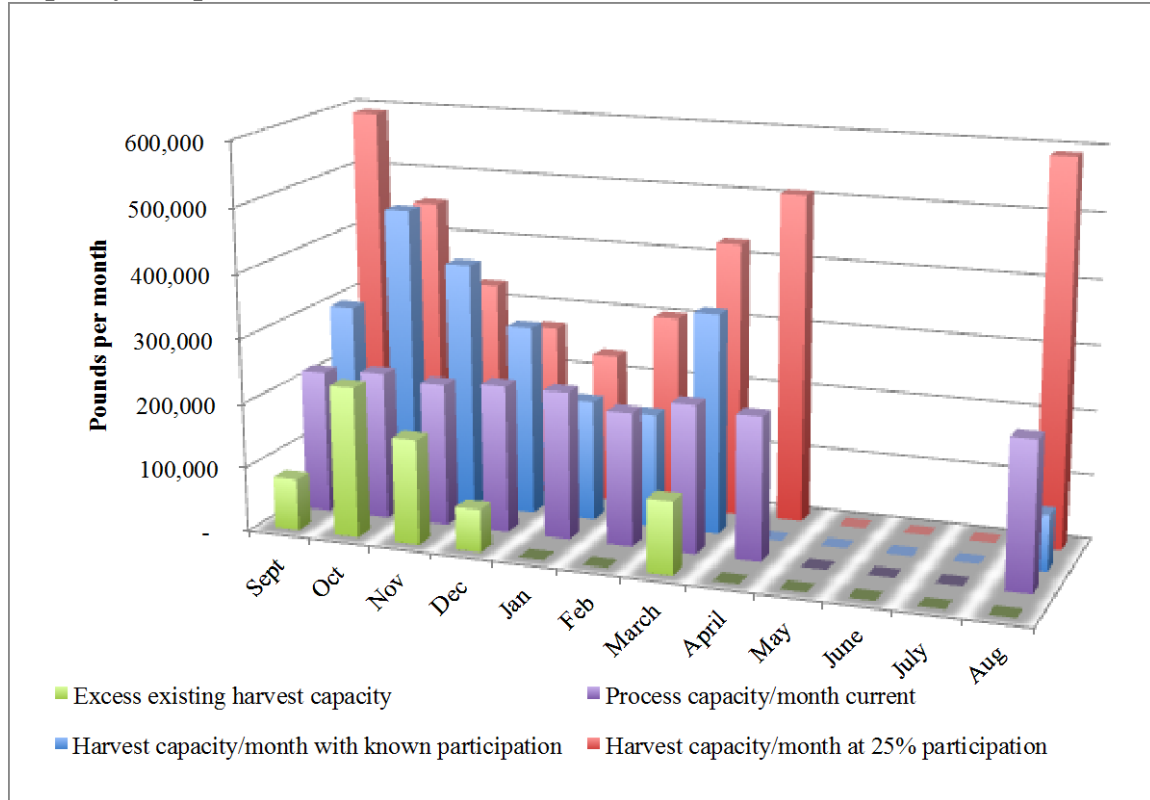
The economic assessment examines four scenarios, all of which have 50% of supply destined for production.

- **Scenario 1:** Landed volume based on 2013/14 weekly reports. Whereas harvesters stated they could not harvest some days due to oversupply to plants, this scenario represents the minimum threshold of harvesting activity.
- **Scenario 2:** 2013/14 landed volumes increased 27.7% to account for average estimated unreported activity as calculated for 2011-2013. This scenario is intended to reflect unreported landings activity; however, with the revised reporting system and auditing activities in place for 2013/14, this may overstate the estimated harvesting and processing efforts.
- **Scenario 3:** Estimated landings based on 2012/13 numbers of active vessels per month harvesting every day available. This scenario is intended to reflect the harvesting activities if the landings limitations during the 2013/14 season did not exist.
- **Scenario 4:** Estimated landings based on 25% average license utilization harvesting every day available. This scenario represents the upper supply threshold, and maximizes utilization of available processing capacity.

Excess harvesting capacity exists: The following exhibit contrasts processing capacity to scenario three and four harvesting capacity. Though calculated on a weekly basis, to reflect the holding duration for live urchins, for ease of presentation results are presented monthly.

The estimated excess harvest capacity is at least 1.0m pounds per year, or 50% more than processing capacity, ~2.0m. On a monthly basis however, processing capacity is exceeded by 100%, 74% and 49% in October, November and March respectively. This necessitates either a live urchin export policy which would accommodate seasonal variation or be measured on an annual basis.

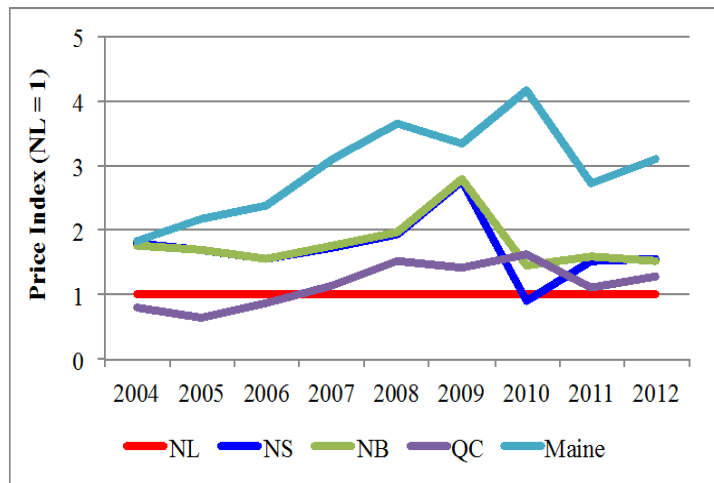
Capacity comparison



Policy guidance: The economic assessment indicates that maximum value from the resource is realized when existing processing capacity is optimized and supply exceeding this capacity can be exported live. Therefore it is important for industry growth and economic return that a balance is struck that maximizes harvesting activity while providing meaningful employment to plant workers. This necessitates a policy that permits shipping out live urchins during periods when supply exceeds a pre-established production threshold. The following guidance to policy for the 2014/15 season is provided:

- All landings should continue to go through registered plants in NL. This permits effective monitoring of activities without the need to deploy additional inspection or auditing resources. Though harvesters may perceive plants will extract more than a fair value for handling the product, in reality these plants are aligned so closely with Maine producers that prices should remain consistent regardless if shipped direct or handled through a plant.
- The 50/50 formula should remain in place and be measured on an annual basis. Flexibility on how much to export and when, should be given to producers in order to meet various supply scenarios. This provides a policy that is easy to monitor and should be reasonably easy to enforce if identified landings variances can be reduced or eliminated.
- Any buying and processing policy should remain in place for a three-year period in order to provide the necessary stability to permit both harvesters and producers to make capital investments in support of the sector.

Shore price gaps have reduced since outside buyers were licensed: Shore prices increased steadily in other regions from 2006 through 2008. When outside buyers were licensed and live exporting commenced in 2010, the price index versus other provinces reduced significantly. Whereas NS and NB harvesters were receiving at least twice the price received by NL harvesters in 2008 and 2009, this reduced to a 50% differential after outside buyers were introduced in 2010. Quebec landed prices surpassed NL in 2007, and averaged 50% more in 2008 through 2010, and were almost equal in 2011 and 2012. Maine landed value were 3.5 times the value of NL prices in 2008 and 2009 and have reduced to 3.0 times since 2011



Conclusion: Shore price gaps between NL and other regions reduced when outside buyers were present, indicating that these buyers contributed to increasing harvester returns of at least \$0.10 per landed pound and something less than \$0.35 per pound.

Atlantic producers have entrenched relationships: When Maine producers began sourcing live urchins in NL, both shore price and export price differentials reduced. When policy changes occurred in 2012, requiring all live exports to be directed through producers, the direct relationship between outside buyers and harvesters was eliminated. This policy change necessitated a closer working relationship between NL and Maine producers. Since that time, NL producers have forged working relationships with both Maine producers and NB traders. Currently, NL producers and NB traders are aligned either through partnership or buying agreements with the producers in Maine.

There is now a symbiotic relationship, as NL producers are using Maine, via NB, as their primary market and Maine is increasingly relying on NL supply, whether it be in live, semi processed, or finished product format.

Conclusion: Relationships between Maine and NL producers are well established, which has resulted in improved shore prices and market access than in the past. However, this relationship may not result in further shore price premiums if outside buyers are again permitted to buy directly from harvesters.

Unreported landings have occurred each year: A review of trade and landings information indicates that there have been unreported landings each year of the review. This analysis is quantified by the fact that the roe yield would have had to range from 11%-44% in the years 2004 through 2009 in order to reconcile exports to landings. It is estimated that landings were understated at least 27.7% from 2010 to 2012 when outside

buyers were permitted to buy directly from harvesters.

In the 2013/14 season the DFA required weekly reports from producers which includes landings, production and labour content. Further, the DFA has completed two audits of producers during the season. These two information sources should permit the DFA to complete a comprehensive reconciliation of supply, production and trade. This reconciliation will reveal whether the management measures implemented in 2013/14 were effective at reducing or eliminating misreporting.

Average market prices for green urchins are less than other supplies:

As illustrated in the adjacent table, U.S. supply of roe, which includes most of the Canadian supply, have a low market position versus other supplies.

This summary of prices over the past year remain relatively consistent on a monthly basis in relation to other products.

Average Tsukiji roe prices (Yen/100g)

	Yen/100g	Ranking
Japan White L 300g	3,094	1
Japan Red L 300g	2,133	2
Japan Red M 150g	1,936	3
Japan White M 150g	1,411	4
Japan Red 100g	963	5
USA 100 g	834	6
China S Korea L 280g	714	7
USA 300 g	539	8

Source: Minato-Tsukiji.com, year ending March 2014

Consultations resulted in several recommendations: The most consistent theme from discussions with harvesters, producers and outside buyers was the request for policy stability for some finite period of time. Given the turmoil in the sector in recent years and the many changes in policy since 2012, all stakeholders in the sector are hesitating to invest further. Providing a stable policy environment is required in order for all stakeholders to make informed decisions about capital and resource investment for the next three to five years.

Price transparency is required, and all participants agreed the mechanism to achieve this is through a grading program. Most parties felt the program is best delivered by grading at the plant in order to reduce costs and where a suitable grading environment exists. In order to better suit market needs, producers would like a grading program to prescribe a minimum yield recovery, 8%, and a larger minimum size, 50mm or 52mm.

Harvesters expressed concern regarding a downward trend in size, indicating significant fishing pressure on older urchins. There is no formal scientific survey of sea urchins in NL, and there is no consistent collection of data that can be a proxy for abundance, maturity, or growth of sea urchins. Developing and implementing a program to gather benchmark science data had some support and would permit monitoring changes to the stock in the future.

DFO licensing policy should be reviewed with the objective of developing a position paper on specific areas of concern, then engaging DFO to modify policies. The areas of concern expressed during consultations include minimum carapace size, season opening dates, resource access in areas not currently fished, observer coverage and science

Project Purpose: The purpose of this project is to assess the historic and current situation in the sea urchin sector both in NL and elsewhere and to provide recommendations to the provincial Department of Fisheries and Aquaculture (DFA) to optimize the performance of this sector. These recommendations must give consideration to both harvesting and processing capacity, effort required to monitor proposed policy changes, and the impact of changes to both primary stakeholder groups.

Project Methodology: The primary means of gathering information were through consultations, Appendix I, with harvesters, processors, and buyers, a literature search regarding the species and competitive species, and sourcing and analyzing statistics regarding landings, prices, exports, and markets. Consultations were held with 13 harvester stakeholders on March 17, 2014, and two plants were visited and operators' views solicited on March 18, 2014. Subsequent follow up was conducted with the third producer and two outside buyers.

The period of review for this project was 2004 to 2013, though there is some historical information used where appropriate.

Historical Context: The Newfoundland and Labrador sea urchin fishery has been slow to develop. Development initiatives began as early as 1969, with increased focus on development of the fishery in the early 1990's, after the cod moratorium. Continued efforts saw a peak in the annual harvest of 1.9m pounds valued at \$1.5 million in 2003. Volumes declined after this peak, particularly from 2007 to 2010, during a period of economic down turn. Environmental conditions, non-traditional harvesting methods and logistics have resulted in a lengthy and challenging development process for the sea urchin fishery.

The sea urchin sector in NL has faced many challenges since the fishery commenced. These include market challenges such as fluctuating prices due to supplies in the target market, Japan, and valuation of the Yen versus the Canadian dollar. Processing challenges including labour cost versus other regions, the ability to identify and pack the numerous grades of roe demanded by Japanese buyers, and higher logistics costs than other regions.

Species: Sea urchin is a member of a large group of marine invertebrates in the phylum echinodermata family including starfish, sea cucumber, sea lily, and brittle star. It has a spherical body, five equal body segments and is covered with long moveable spines located on its hard shell. In North America, there are two predominant species harvested, green and red sea urchins. Both species feed on kelps and other algae.¹

The green sea urchin (*Strongylocentrotus droebachiensis*), is the most widely dispersed of all Echinoderms, having a circumpolar distribution. Its range extends into the Arctic

¹ www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryDive.seaurchin

regions of both the Pacific and Atlantic Oceans. On the east coast of North America, the green sea urchin is commonly found from Baffin Island, south to Cape Cod and in deeper waters to New Jersey. They are also found in Greenland, Iceland and northern Europe. In the Pacific, they are found from Alaska to Washington states and westward to Kamchatka, Korea and Japan.²

Green sea urchins are found in a wider variety of habitats, but concentrations are more predominant in more protected waters and embayments. Highest concentrations occur from intertidal areas to depths of 30 feet.

Red sea urchins (*Strongylocentrotus franciscanus*) reside and are fished from Baja California, north to the Gulf of Alaska and Kodiak. Red sea urchins occur on rocky shorelines of the outside coast with highest densities in the subtidal range down to 40 feet.

Harvest Method in NL: Harvesting activity occurs using small inshore vessels, as they are less expensive to operate and can operate in shallow coastal waters. Urchins are harvested in shallow sub-tidal areas by SCUBA divers utilizing a hand held rake and net bag for collection. Safety regulations require additional tenders and stand-by divers on site during the harvest. In Maine, as well as New Brunswick, there is a limited drag fishery for this species.

Divers normally target a kelp bed that has historically been fished at a specific time of the year. Divers look for the leading edge of an algae bloom where the stronger and larger urchins will normally be feeding. The divers will open several urchins to determine the maturity and roe content and send samples to the vessel for further sampling, which occurs throughout the day. If there is adequate abundance and roe content the divers will harvest the urchins from the leading edge of the algae bloom.

Processing Sector: Currently there are three licensed and active producers in NL. In prior years there were as many as 10 licensed plants. These three active producers have extracted roe and exported whole live sea urchins for processing in Maine. Roe extraction is labour intensive, and the various colours of roe and milt requires a well-trained and experienced workforce. NL producers pack roe into consumer packs, 100g-200g tray packs, and waterpacks, 250g to 1,000g, for subsequent re-grading and packing in Maine. NL producers are packing into as many as eight grades, whereas Maine producers pack 19 separate grades, 18 based on colour and one for broken roe/milt segments.

Other provinces have had very limited roe production in recent years, and landings in these regions are directed to Maine for processing.

There are four Maine sea urchin producers currently operating. Whereas landings in Maine have reduced, due to declining effort of harvesters and lower stock abundance, these producers have actively pursued supplies from all regions. Supply volume, processing expertise, collection and distribution logistics, and market access provide Maine producers with a strategic advantage over producers in all other regions of the

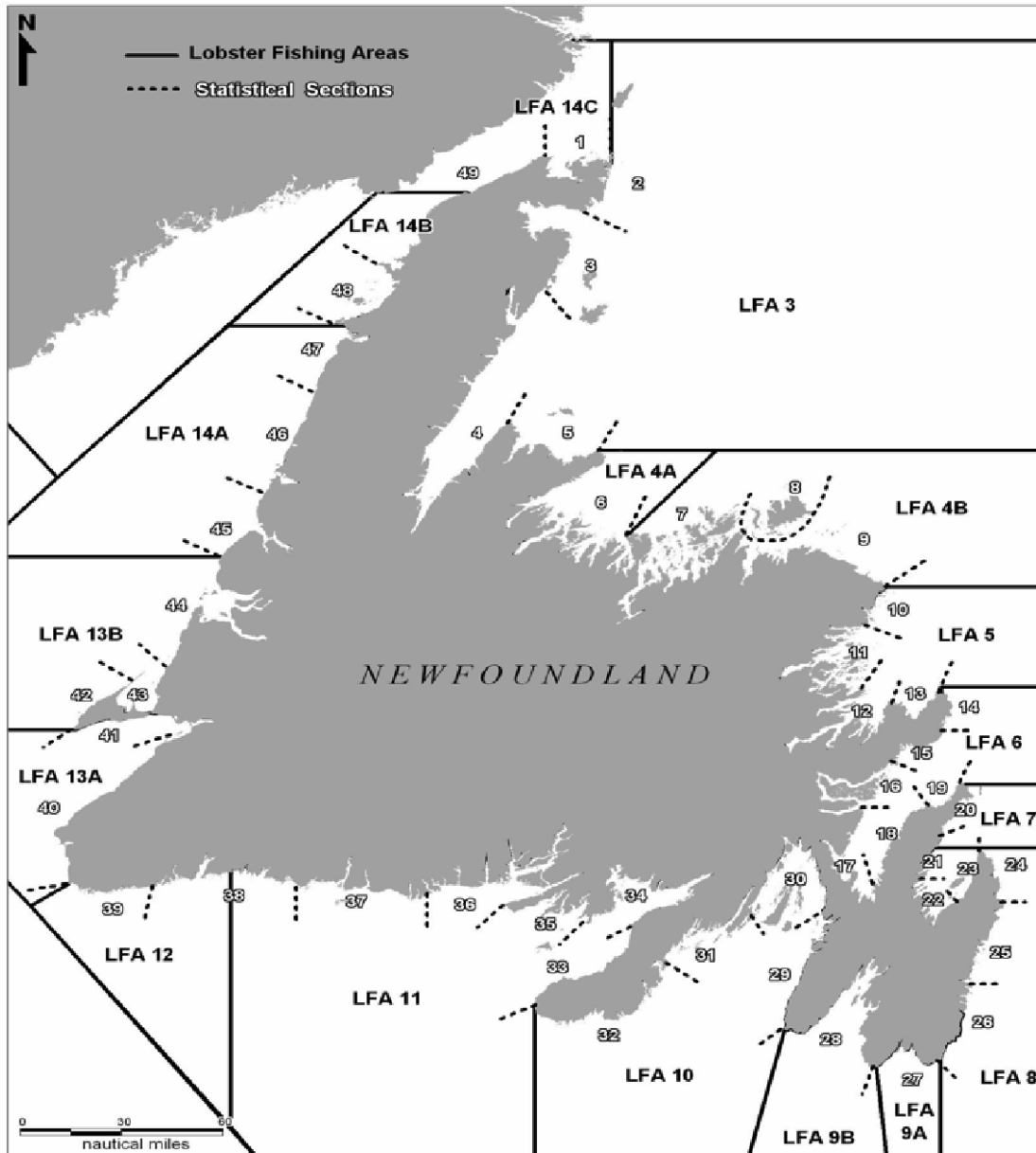
² www.fishaq.gov.nl.ca/research_development/fdp/sea_urchin_green.pdf and <http://www.inlandseafood.com/sea-urchins>

Northwest Atlantic.

Fisheries Management: In NL, the sea urchin fishery does not have an Integrated Fisheries Management Plan (IFMP). The fishery is managed by Fisheries and Oceans Canada under the following conditions (Appendix II):

- License is restricted to a specified fishing area, which aligns with Lobster Fishing Areas (LFA's).
- Fishing method is limited to SCUBA diving with a maximum four divers authorized per license.
- Only vessels less than 19.8m (65') and registered with Fisheries and Oceans Canada may participate in the fishery.
- The minimum retention size is 48mm (1 ^{7/8}"") shell diameter excluding the spines.
- Fishing Season: LFA 2 - June 25 to November 30, LFA 5, 6, 12 - October 01 to April 30, LFA 4, 7, 8, 9, 10, 11 - September 1 to April 30
- This fishery is subject to at-sea observer coverage, though anecdotal information indicates there has been no observer coverage in recent years.

Exhibit 1.1: Map of management areas (excluding area 2)



Source : DFO

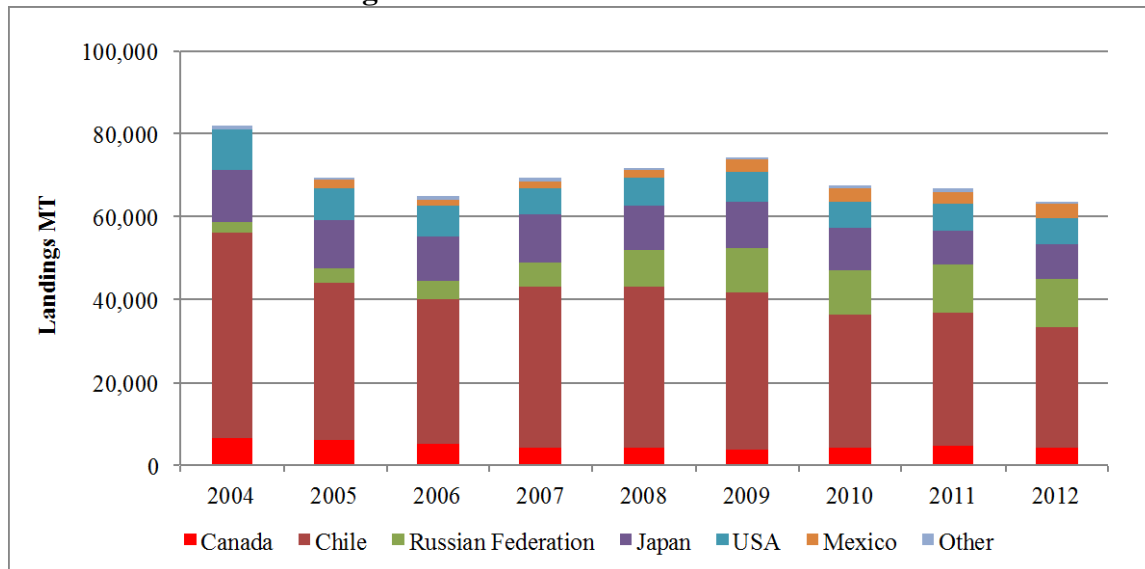
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SEA URCHIN INDUSTRY

2.1 Supply and Prices

Global landings of sea urchins have declined from more than 100,000MT per year to current levels of 60,000-70,000MT. In the past 10 years there have been 26 countries, which have landed sea urchins; however, in any given year a maximum of nine countries have recorded landings. Canada comprised 7.8% of global landings in the period reviewed, remaining one of the top five supplier countries. Most major producing countries are selling live urchins or fresh roe; however, Chile produces primarily frozen roe in order to meet logistics challenges for sales to Japan.

Exhibit 2.1: Global landings of sea urchins



Source: FAO

There are hundreds of species of sea urchin in the world.³ Of the eight species in Chile, only *Loxechinus albus* is harvested commercially.⁴ Referred to a Red Sea Urchin, the season runs from March until October⁵ providing supply to the market when the Atlantic Canadian fishery for the most part is closed. There are several species harvested in Japan depending on location with the most popular species being *Strongylocentrotus intermedius*.⁶

The Northwest Atlantic sea urchin supply has declined 31% and Maine 67% during the period reviewed. Reported Atlantic Canadian landings have remained relatively static over the past several years at just over 3,000t.

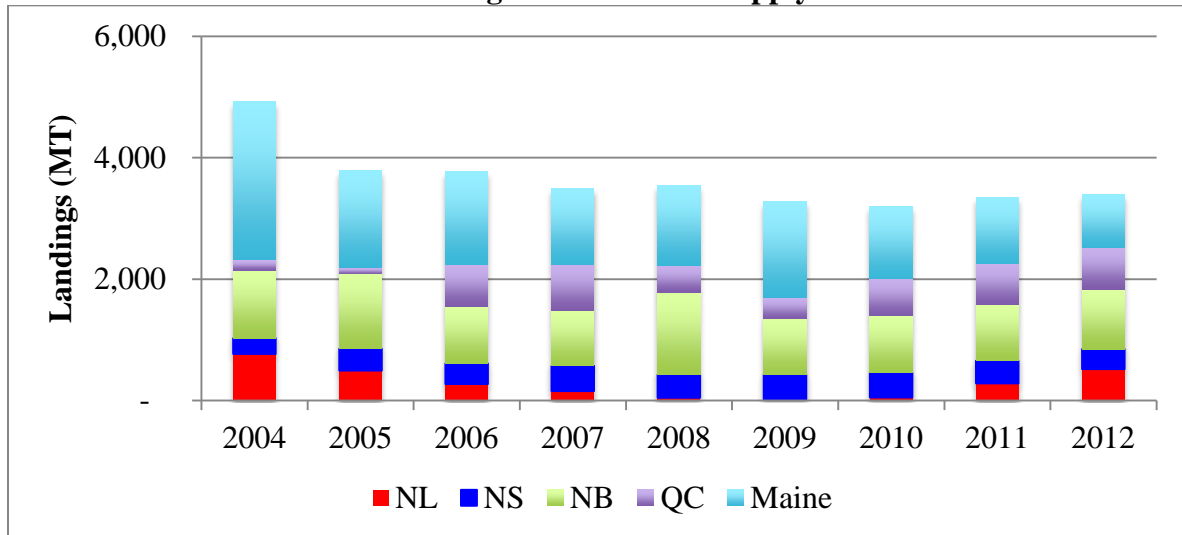
³ <http://www.seafoodsource.com/en/seafood-handbook/shellfish/sea-urchin>

⁴ <http://link.springer.com/article/10.1111%2Fj.1444-2906.2007.01464.x#page-1>

⁵ http://www.cisandina.com/sea_urchin/sea_urchin.html

⁶ <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-7345.2011.00461.x/abstract>

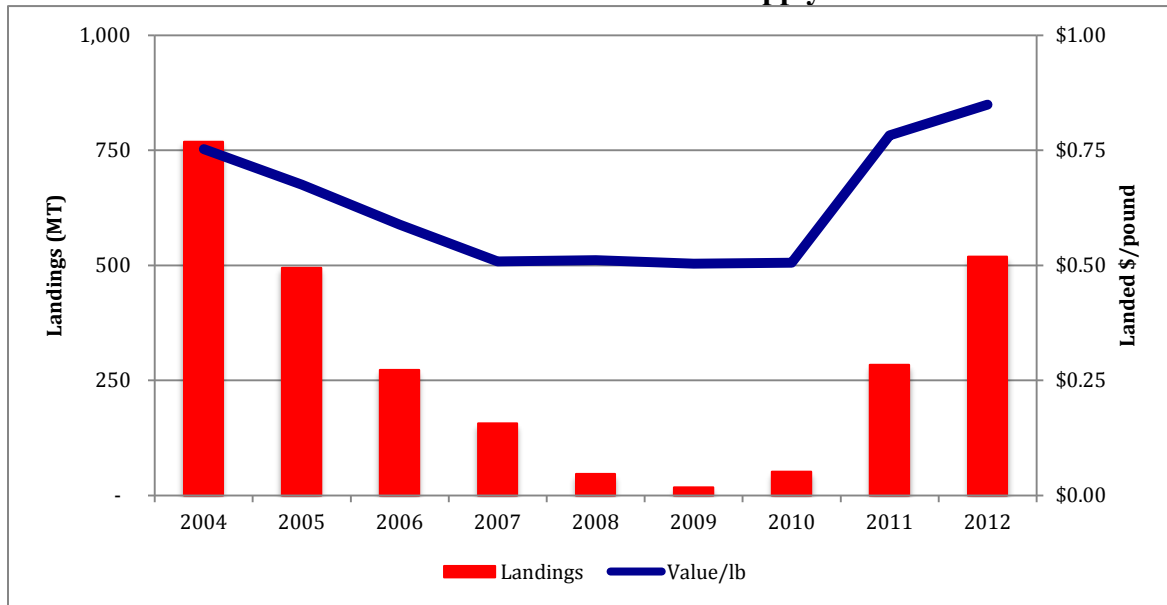
Exhibit 2.2: Northwestern Atlantic green sea urchin supply



Source: DFO, National Marine Fisheries Service, Pisces Consulting Ltd

In NL, landings began to decline after the 2004 season and did not rebound until 2011, when prices increased. The period of low activity appears to be related to lower market prices resulting in record low shore prices. Alternative information suggests NL landings were higher, ~100MT, than reported during 2009 and 2010, and perhaps as much as 500MT higher in 2011 and 2012 when outside buyers were procuring directly from harvesters. The trend from low landings in 2009 to higher landings in recent years remains the same.

Exhibit 2.3: Newfoundland and Labrador sea urchin supply



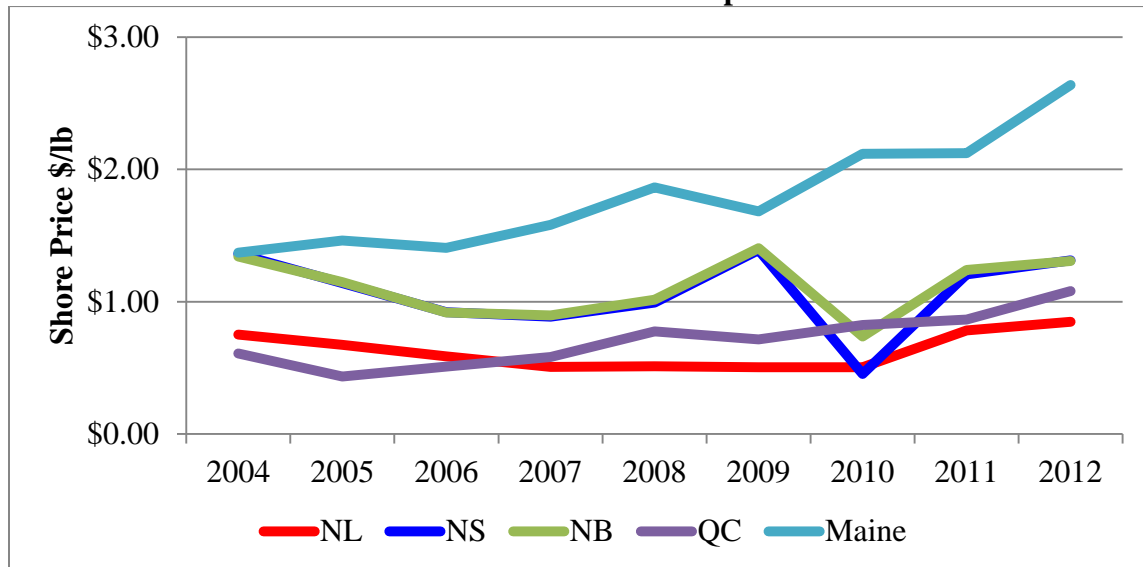
Source: DFO, Pisces Consulting Ltd.

Shore Prices: Shore prices have increased steadily in most regions in recent years, buoyed by improving export prices since 2008. On average, Northwest Atlantic urchin roe shore prices increased 83% in the period reviewed, driven primarily by Maine where prices have almost doubled in the past 10 years.

NL prices have increased a modest 13% in the past 10 years and still remain lower than all other supplying regions. Some of this price spread between NL and other regions is attributable to benefit costs and additional logistical costs. NL shore prices track similarly to Quebec, both provinces provide similar and lower volumes than other regions. NS and NB prices are identical through most of the time series, supporting anecdotal information that the same buyers from Maine are active in both regions.

Anecdotal information suggests the price discounts received in NL and Quebec is due to higher logistical costs for collection and product distribution. Though the price differential due to inherent quality differences is difficult to quantify, several information sources have stated that yields from NL urchins are 7%-8%, whereas other provinces provide up to 10% and Maine product averages 12% or better. Further, the minimum size in NL is smaller than that permitted in Maine and other regions, which increases roe extraction costs and poses import risk to Maine buyers.

Exhibit 2.4: Northwestern Atlantic sea urchin shore prices



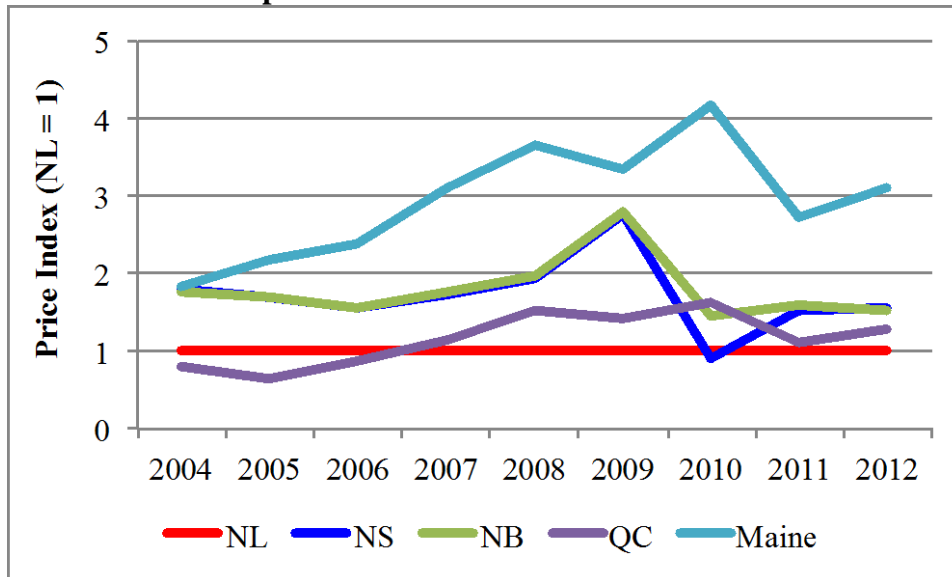
Source: DFO, National Marine Fisheries Service, Pisces Consulting Ltd

Analysis of the prices received in NL, examined on an index basis, indicate:

- Shore prices were increasing steadily in other regions from 2006 through 2008 and in Canada until 2009.
- When outside buyers and live exporting were introduced in 2010, the price index versus other provinces closed significantly. Whereas NS and NB harvesters were receiving at least twice the price received by NL harvesters in 2008 and 2009, this reduced to a 50% differential after outside buyers were introduced in 2010.
- Quebec landed prices surpassed NL in 2007, and averaged 50% more in 2008 through 2010, and were almost equal in 2011 and 2012.

- Maine landed value were 3.5 times the value of NL prices in 2008 and 2009 and has reduced to 3.0 times since 2011.

Exhibit 2.5: Shore prices indexed to NL



Source: DFO, National Marine Fisheries Service, Pisces Consulting Ltd

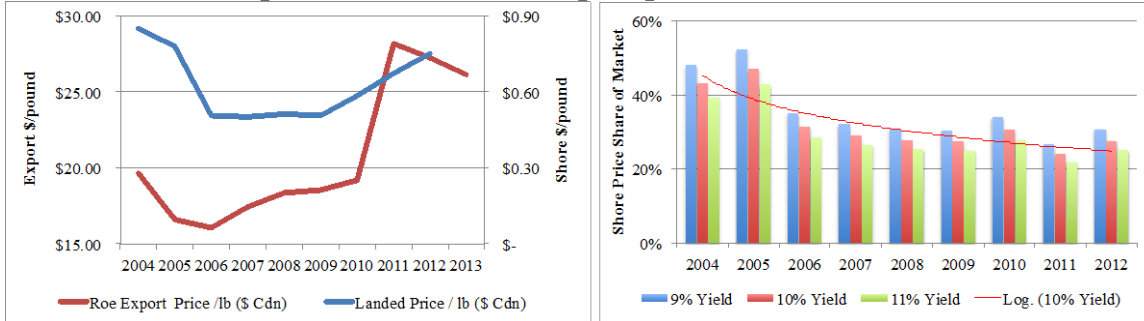
One NB buyer stated that NL harvesters were paid \$0.45 per pound less than NB harvesters in order to cover the collection and logistics costs. This statement is supported by DFO average landed values, which in 2011 and 2012 indicate a \$0.46 shore price difference. In the year prior to outside buyers being present, the price gap was \$0.90 and average shore prices were reaching historic shore price highs experienced in 2004 (\$1.34). The difference between NB and NL in this previous high period was \$0.59. This indicates that outside buyers could have been responsible for an increase in shore price of at least \$0.10 and something less than \$0.35.

Conclusion: Shore price gaps between NL and other regions reduced when outside buyers were present, indicating that these buyers contributed to increasing harvester returns of at least \$0.10 per landed pound.

Given that almost all Northwestern Atlantic sea urchins are processed into roe, the roe export price should have a clear relationship to the shore price. The following charts examine firstly the roe export price received by NL firms and the shore price paid to NL harvesters, and secondly the percent shore price paid relative to the export price.

As illustrated, export prices improved steadily and markedly, over the period of review, since price lows of 2006. However, shore prices remained static from 2006-2009 while export prices improved. Expressed as a percent of market price, converted back to value per whole pound, shore prices were around 40% of market price in 2004-2005, then declined to the 30% range as market prices began to increase in 2006, and have declined further to 24% and 28% in 2011 and 2012 respectively. That said, some outside purchases during 2011-2012 have remained unreported and anecdotal information suggests that a price premium for whole exports were received, which would have resulted in higher than illustrated shore prices.

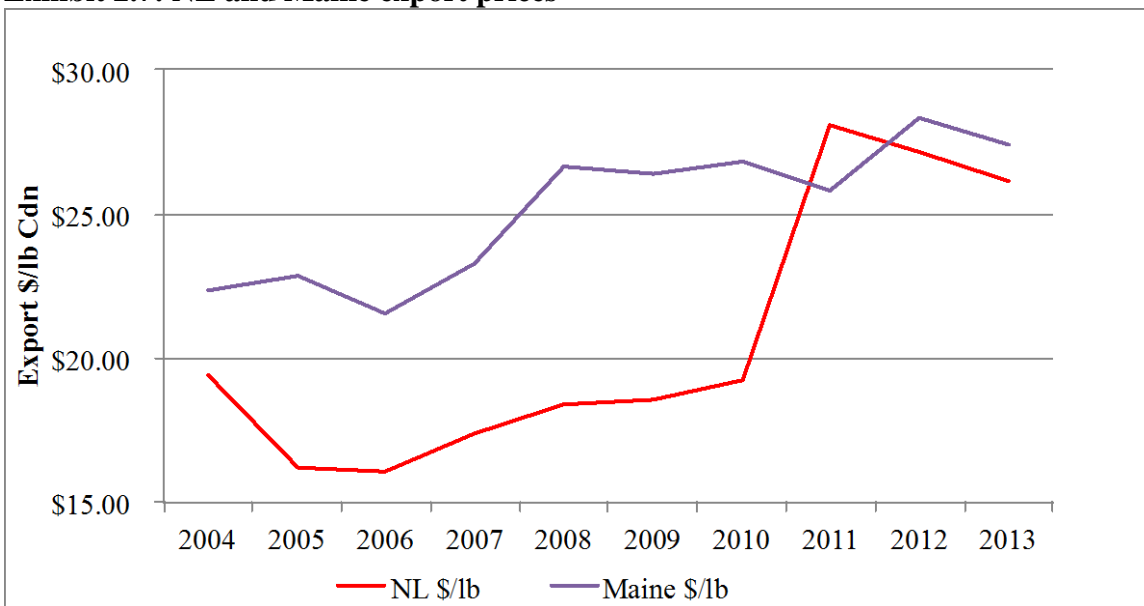
Exhibit 2.6: Shore prices relative to roe export price



Source: Export statistics and DFO landing data

Increased Business Reliance on Maine: The following exhibit illustrates the export price differences between NL and Maine producers. As clearly illustrated, the value per pound of exports increased significantly at the same time that Maine producers began sourcing whole sea urchins in NL, indicating a much closer working relationship between NL and Maine producers had been established.

Exhibit 2.7: NL and Maine export prices



Source: NMFS and Strategis

As NL producers became more aligned in dealing with Maine producers, exports of live urchins to NB traders became commonplace. These NB traders are aligned either through partnership or buying agreements with the producers in Maine. These relations have resulted in a significant decline in recorded exports from NL, as urchins are routed through traders in NB to producers in Maine.

The following exhibit provides an estimated reconciliation of trade and landings for the period reviewed.

Exhibit 2.8: NL landings reconciliation (whole weight equivalent)

	Reconciliation (MT)					Adjusted Landings	Notes
	Landings	Whole Export	Roe Export	NB Export	Difference		
2004	769.0	0.5	1,239.3		(470.8)	1,239.8	Jap Whole
2005	495.0	2.6	934.6		(442.2)	937.2	HK Whole
2006	273.0	26.4	958.9		(712.3)	985.3	US Whole
2007	157.0	0.7	415.9		(259.6)	416.6	US Whole
2008	47.0		296.6		(249.6)	296.6	
2009	18.0		52.9		(34.9)	52.9	
2010	52.0		47.1	139.3	(134.4)	186.4	excluding TGK & FAS
2011	284.0		58.4	366.7	(141.0)	425.0	excluding FAS
2012	519.0	8.8	6.8	647.4	(143.9)	662.9	

Source: DFO landings, Strategis, personal comms with buyers

Notes: Roe converted to whole at 7%

Almost all roe sent Japan, none to US.

Limited live exports to US in 2005 and 2006

This above analysis indicates there have always been unreported landings. This is quantified by the fact that roe yield would have to had ranged from 11%-44% in the years 2004 through 2009 in order to reconcile exports to landings.

Conclusion: Landings have consistently been under reported, in the past as indicated by a reconciliation of export data to landings.

Since 2010, export volumes have been very low, indicating that most roe and live whole is sold through traders in NB, who subsequently forward the product to Maine for further processing and final export. Buyer representatives and NL exporters provided some export estimates for 2010 through 2012; however, even these estimates were provided by all buyers in 2012. Contrasting these estimated exports to NB, based on anecdotal information, to increases in exports from NB to the US, indicate on average NB could have been purchasing 257MT, 492MT, and 736MT from NL in 2010, 2011 and 2012 respectively. These estimates certainly support the more conservative estimates provided in the previous exhibit.

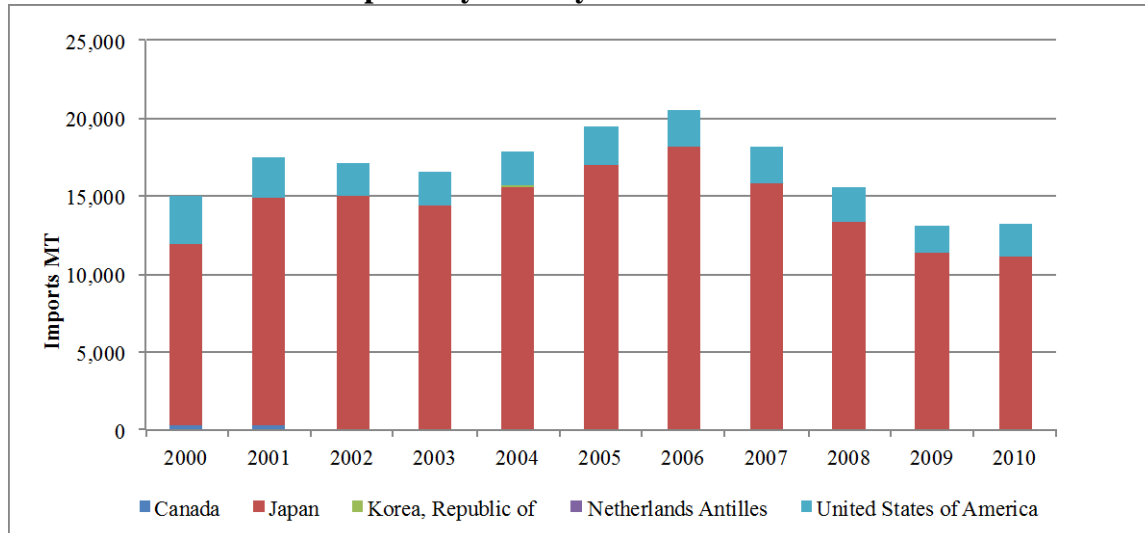
This relationship between NL and Maine producers is now formalized with two of the three NL producers having some form of partnership with Maine producers and the third producer selling wetpack urchins to Maine producers through NB. There is now a symbiotic relationship, as NL producers are using Maine, via NB, as their primary market and Maine is increasingly relying on NL supply, whether it be in live, semi processed, or finished product format.

Conclusion: Relationships between Maine and NL producers are well established, which has resulted in improved shore prices and market access.

2.2 Global Markets

Sea urchins are harvested by up to 26 countries worldwide, and much of this supply is destined for Japan, which is the primary market. Japan imports more than 85% of the world's trade of sea urchin (FAO, 2010). The other major importer is the U.S., comprising almost 14%, which is destined for ethnic markets.

Exhibit 2.9: Sea urchin imports by country



Source : FAO

In Japan, sea urchin roe is called uni. Uni is marketed in several forms including fresh, frozen, steamed, baked and salted. The most popular and highest value is served fresh on sushi. Sea urchin roe varies in colour from bright yellow to orange and even gray. Its texture, size, taste and firmness also can vary depending on what the urchin has been eating, the urchin's sex, time of year, and habitat conditions. These differences in quality significantly affect the value and the format of presentation.

The Japanese market prefers large, firm, light yellow, female, roe. The highest quality roe goes to restaurants and sushi bars, medium quality finds its way into gift packs while lower quality goes to supermarkets. Demand may vary depending on factors such as the Japanese economy, seasonal holidays, exchange rates, and the availability of urchins or alternative seafood products from elsewhere in the world.

There are a several species of fresh chilled sea urchin products that are consumed in the Japanese market. The primary species are red sea urchins and green sea urchins from North America. Red sea urchin roe is imported from California and British Columbia whereas green sea urchin roe is imported from the east coast of Canada, and Maine while whole live animals are imported from British Columbia and Alaska⁷. Statistics in the Japanese market do not separate red and green roe from North American supplies, however the following table and graph illustrates average prices for various products in the market. This information reveals the range of pricing, and where imports from the USA, including supplies procured in Canada, rank against other supplies.

⁷ www.pac.dfo-mpo.gc.ca/fm-gp/mplans/2013/red_urchin-oursin_rouge-sm-2013-eng.pdf

Exhibit 2.10: Average Tsukiji roe prices (Yen/100g)

As illustrated in the adjacent table, U.S. supply of roe, which includes most of the Canadian supply, is predominantly green sea urchins. These U.S. imports realize some of the lowest prices at auction in Tsukiji. This summary of monthly prices over the past year is relatively consistent in relation to other products.

	Yen/100g	Ranking
Japan White L 300g	3,094	1
Japan Red L 300g	2,133	2
Japan Red M 150g	1,936	3
Japan White M 150g	1,411	4
Japan Red 100g	963	5
USA 100 g	834	6
China S Korea L 280g	714	7
USA 300 g	539	8

Source: Minato-Tsukiji.com, year ending March 2014

Conclusion: Green sea urchin roe appears to be one of the least expensive supplies in the Japanese auction market.

Japan continues to impose tariffs on sea urchins, 7%, which is significantly higher than the average seafood import tariff, ~4%, in Japan (Source: Foreign Affairs).

Supplies of green sea urchins from Iceland and Norway are exported live to mainland Europe, primarily France, for further processing⁸. Apparently, this is due to economic reasons; however, French chefs at upscale restaurants would prefer preparing the product from live to serve.

2.3 NL Harvesting Method

A description of the harvest method used in NL is provided:

- Most active enterprises have one or two divers, as indicated by meeting participants. Under condition of license one person must remain aboard the vessel whenever a diver is underwater.
- Divers search the bottom looking for algae blooms. When a bloom is identified, the diver located the leading edge of the algae and identifies if suitable size urchins are present. If urchins are present they bag a sample, return to surface and sample for roe content and maturity.
- Urchins are raked and placed in dive bag, which is floated to the surface when full. The bag is retrieved by the person onboard and placed in totes.
- During very cold weather, such as this past winter, bags of urchins are kept tied to the boat under the water. Prolonged exposure on deck will freeze and kill the urchins. This cold weather also necessitates harvesters remain closer to shore,

⁸http://skemman.is/stream/get/1946/8709/23553/1/Green_Sea_Urchin_Eyjafj%C3%B6r%C3%B0ur.pdf

therefore reducing steam time and exposure of urchins to the cold weather.

- When finished harvesting the buyer is notified and dispatches a truck to the landing location. The urchins may be weighed as loaded. Totes for the individual enterprise are identified and kept separate from other supplies.
- Normally a bed is harvested twice per year, though it is acknowledged that some beds are harvested more frequently.
- Some beds only have small urchins and are never harvested. The reason for lack of growth or whether the urchins move prior to growing is unknown.
- Beds that have more current and/or tide result in urchins with thicker shells, resulting in lower roe yields.
- Harvesters target the large, up to 40 year old, urchins. However, the abundance of these larger urchins appears to be declining. It is estimated that a 500mm (carapace width) urchin is 10-12 years old in Maine; the colder NL waters may indicate this is a 15-20 year old urchin. Some aging is currently being done on urchin teeth; however, the results of using this method of aging have not yet been proven conclusive.

Other comments from harvesters provide further insight into some challenges related to harvesting.

- When urchins are panned onboard the vessel, the spines of the urchins can damage the urchins surrounding them by penetrating the soft underside. This reduces the opportunity for survival of sea urchins returned to the ocean, and eliminates any opportunity to ranch sea urchins unless modified handling methods are developed.
- Experiments conducted by harvesters indicate if urchins are placed in shrimp bags, 22 pounds per bag, versus pans, 60-80 pounds, and are suspended in water they will survive at least seven days. The point appears to be that the urchins must remain in a neutrally buoyant environment to improve survivability.
- Exposure of sea urchins to the cold air can cause mortality in a relatively short period of time.

Conclusion: *Development and distribution of a 'Sea Urchin Harvesting and Handling' handbook would benefit license holders .*

2.4 NL Production Method and Distribution

The processing of sea urchins to remove roe is extremely labour intensive. Limited technology is employed in processing, with most processing completed on large tables, except one plant that is using their existing crab processing line. Anecdotal information

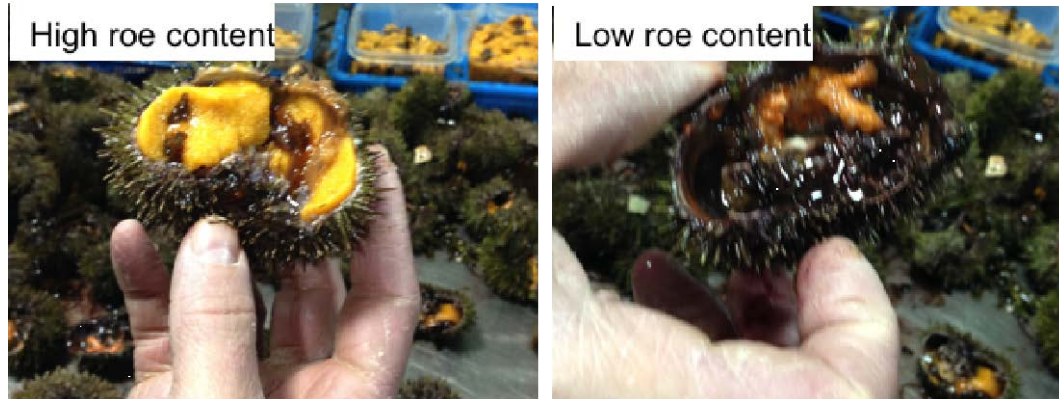
suggests that the four producers in Maine use very similar techniques as those employed in NL, indicating there is no technical competitive advantage. Over the past 10 years the minimum wage in NL has increased by 66% and the estimated base rate for this assessment is \$11.85, whereas Maine labour rates are reported to be ~\$7.50 per hour.

Employees must be well trained in order to perform the necessary tasks to ensure that yield, quality and productivity are maximized. A description of the processing methods observed during site visits in NL is provided:

- All live urchins are held in refrigerated storage until processing capacity is available. The urchins can be held for 7-10 days and still remains suitable for processing. Comments by producers indicate that roe extraction is best done after two days from the time of landing. This permits much of the water in the urchin to drain and permits for less effort for roe extraction.



- Utilizing a specialized tool for opening the urchin, staff crack each urchin, exposing the gut and the roe. This is a very fast and rough operation, and can cause significant damage to the roe if the tool is not centered or penetrates too far into the urchin.



- Using a custom designed spoon, other staff scoop the roe from the urchin, sometimes with viscera attached, visually determine the colour grade, and place the roe in the appropriate container. There are five segments of roe in the urchin. These five segments sometimes come out intact in the shape of a flower; however, if roe quality or roe content is low, removal of all segments together is not possible. Due to the variable quality of roe content, producers pack individual segments rather than packing the five segments together.



- Once a container is full, or at regular intervals, the contents of the container are transferred into a tray. The tray is immersed in salt water and the worker manually removes the viscera from the roe while gently moving the tray in the salt water. Very small pieces of roe will fall through the spaces in the tray resulting in processing yield loss.

- When all gut content is removed, the trays of roe are placed in salt water for up to one hour, then immersed in an alum solution for 1-1.25 hours. This alum solution firms the roe, making it easier to handle for the packing process.





- Roe is packed from the trays into either a 100g or 250g tray packs for Japan or into a 200g up to 1,000g wet pack for re-grading and packing in Maine.



- All packed roe is placed in styro containers with ice packs, palletized, wrapped and shipped in refrigerated reefers when destined for Maine, or places on custom sized pallets if shipping by air.



- Shipping direct to the Japanese market, auction in Tsukiji, is done through airfreight. The most direct route is St. John's, Toronto, Japan, though one producer stated they shipped St. John's, Halifax, Toronto, Japan. Shipping to Japan costs ~\$1.00/pound.
- Live urchins shipments to Maine by trailer are 34,000-36,000 pound lots. Quote from a shipping company, indicated a cost of \$3,550 to ship from central Newfoundland to Portland, Maine. This equates to a cost of \$0.10 per pound or \$3.00 per mile. The same shipping cost would apply when shipping semi-processed roe products to Maine.

3.0 INDUSTRY CONSULTATIONS

The most consistent theme from discussions with harvesters, producers and outside buyers was the request for policy stability for some finite period of time. In order to maintain a valuable sea urchin sector the policies around selling and processing must be clear, easily monitored and most importantly, should remain unchanged for at least a three-year period.

Given the turmoil in the sector in recent years and the many changes in policy since 2012, all stakeholders in the sector are hesitating to invest further. Providing a stable policy environment is required in order for all stakeholders to make informed decisions about capital and resource investment for the next three to five years.

Conclusion: All stakeholders are unanimous in the view that the policy environment must remain stable for at least the next three years.

3.1 Harvesting Sector

Limited License and Area Activity: Enterprises are licensed to operate seasonally within specific management areas, aligned with lobster fishing areas. The majority of the active enterprises harvest in Notre Dame, Bonavista and Trinity Bays. A summary of the sea urchin license holders by location is provided in the following exhibit and a listing of individual license holders is included in Appendix III.

Exhibit 3.1: Sea urchin season and licenses by management area

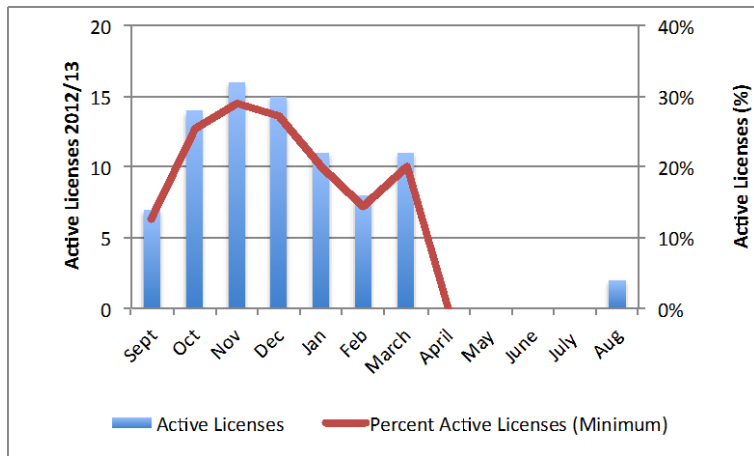
Fishing Area	LFA	Number of Licenses	Season Start	Season End
Labrador	LFA 2	6	25-Jun	30-Nov
Notre Dame Bay	LFA 4	12	01-Sep	30-Apr
Bonavista Bay	LFA 5	14	01-Oct	30-Apr
Trinity Bay	LFA 6	10	01-Oct	30-Apr
Conception Bay	LFA 7	2	01-Sep	30-Apr
Avalon Face	LFA 8	1	01-Sep	30-Apr
St. Mary's Bay	LFA 9	2	01-Sep	30-Apr
Placentia Bay	LFA 10	6	01-Sep	30-Apr
Fortune Bay	LFA 11	1	01-Sep	30-Apr
Southwest NL	LFA 12	1	01-Oct	30-Apr
Total		55		

Source: DFO

Note: LFA is lobster fishing area, same as urchin license area

Exhibit 3.2: Active licenses 2012/13

There are 55 licensed sea urchin enterprises in NL for the 2013/2014 season. In 2012/13 there were 26 active licenses; in the prior two seasons DFO indicates there were 17 and five for 2011/12 and 2010/11 respectively. Given that at least one active outside buyer did not submit purchase slips in 2011/12, the number of active enterprises is believed to be higher.



License activity indicates limited fishing effort in Labrador in the past two years, with all remaining harvest effort in Notre Dame, Bonavista and Trinity Bays. License activity and anecdotal information suggests there has been no activity off the Avalon or in south coast areas for many years.

Conclusion: *Less than half of licensed enterprises participate in the fishery and no fishing activity occurs off the Avalon or in southern fishing areas.*

There was much discussion around the seasonality of the fishery and related license activity, as follows:

- Producers and harvesters concur that, on average, yields are the lowest in September and October. This is not quantified through review of weekly production reports, supporting some statements that selectivity of the right harvest area provides consistently high yields early in the season.
- Active licenses are highest in October after the traditional fishing season in many areas, and when the weather is still favourable.
- Many harvesters support opening beds/areas based on samples, to ensure a minimum yield recovery. Producers suggest an 8% minimum is required for their operation to be feasible.

Conclusion: *Many of the active harvesters participate primarily in the fall fishery when weather conditions are favourable.*

Environmental Challenges: Harvesting occurs in very challenging environmental conditions. Whereas the fishery is executed from August to April, the weather conditions pose challenges. These conditions have significant impact on harvesting activity, in particular wind conditions and ice cover. The 2013-14 season has seen serious challenges related to ice cover, Appendix IV, resulting in very little and sporadic fishing activity

from January through March.

The cold weather also poses challenges during the harvest. Exposure of sea urchins to the cold air can cause mortality in a relatively short period of time. Most harvesters take precautionary measures to ensure mortality is limited and many other harvesters do not fish at all during cold weather. Comments by one outside buyer, indicate that the handling practices in NL need improvement when fishing in cold weather. Specifically, they stated that the pans of urchins onboard should be covered to eliminate exposure to the wind. Further, they recommend that the pans not be stored onshore for long durations of time, instead, coordination with the buyer should ensure the truck is available as close as possible to when the vessel docks.

The ability to harvest is also impacted by wind conditions. Information presented, Appendix V, in the 2002 'Review of Cooked and Peeled Shrimp Industry' report indicates that there are a limited number of days during the fall and winter when the wind speed is less than 20 knots. Whereas the urchin fishery is done close to shore and in sheltered bays, harvesters have indicated the number of maximum harvest days is somewhat higher. A contrast of the number of fishing days between the shrimp report and harvester estimates is provided.

Exhibit 3.3: Fishing days available

Month	Maximum Days of Fishing	Days <20 knots Wind
September	25	18
October	20	13
November	15	9
December	12	7
January	10	7
February	12	10
March	18	13
April	20	17

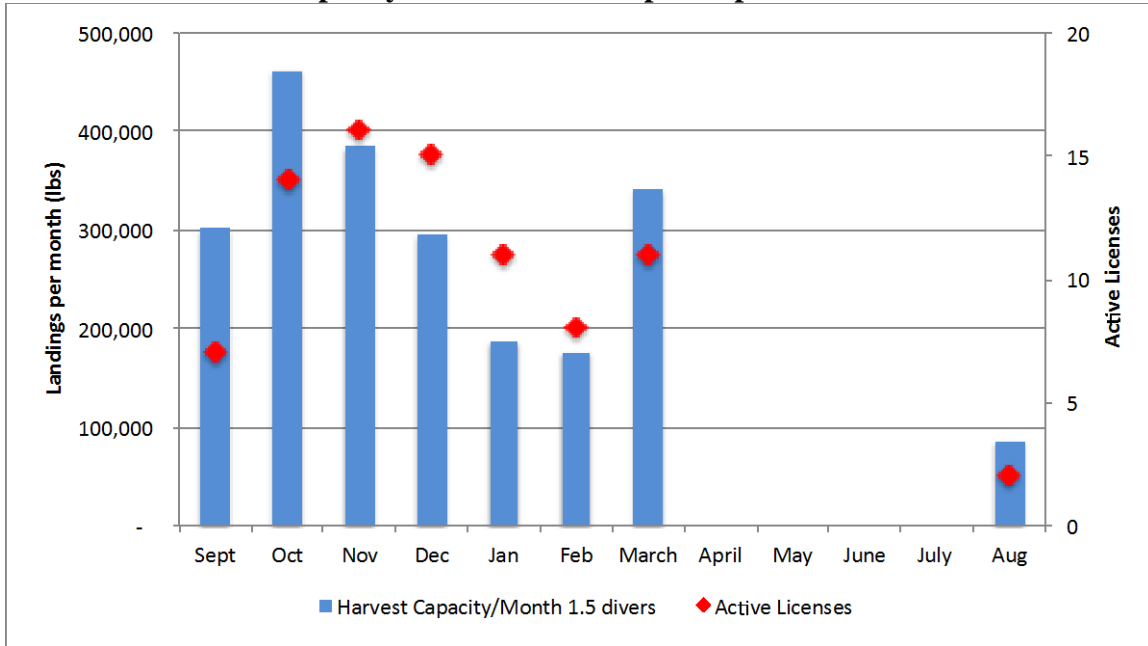
Source: Review of the Cooked and Peeled Shrimp Industry

Conclusion: Harvest activity will be influenced by weather conditions, resulting in varying supply levels from year to year.

Harvest Capacity: Harvesters indicate that each diver can harvest 20-25 pans of urchin per day. The maximum number of divers permitted by license is four, though anecdotal information suggests the vessel size limits the average divers per vessel to 1.5. This equates to each vessel landing ~2,000 pounds per trip, after deductions, of urchins per day, which is quantified by the November DFA audit data.

The following exhibit indicates that given the historical number of monthly participants and harvesting occurs every favourable weather day, the annual landings could be 2.2m pounds per season, which exceeds the maximum historical landings of 1.7m pounds. Further, if fleet participation remained at 25% throughout the season, instead of just peak activity periods, landings would be 3.6m pounds.

Exhibit 3.4: Harvest capacity at known license participation levels



A review of information from DFO indicates that while there are 55 licensed harvesters in the province, not all are active and the number that is active varies by month. For example, in 2012/13 the maximum number of active harvesters was 16 in one month. A review of September to November of 2013 plant audit records indicate the maximum number of active enterprises over the period was 13. This may indicate that license activity has reduced since outside buyers licenses were suspended in November 2012.

Conclusion: Harvest participation rates appear higher when outside buyers are present.

Shore Pricing: Harvesters concur with producers that the prevailing pricing method in 2013/14 provides \$0.10 per 1% yield. For example, a 10% yield equates to \$1.00 pound for whole urchins. Some harvesters indicated that EI and WHSCC fees are deducted from the shore price, contrary to the Labour Relations Act⁹ and Fishing Industry Collective Bargaining Act¹⁰ that requires the buyer to pay these expenses in addition to the shore price. Given that one outside buyer stated that they deducted these expenses from the settlement, this assertion by harvesters may have merit.

The means by which the net weight of the delivered catch is determined causes concern to harvesters. Apparently, the gross weights are done at the point of landing in some instances; however, the net weight, which excludes pan, undersize, detritus and water is determined at the plant.

Determination of yield based on finished packed weight is also an issue of concern. There were assertions that the yield is always 7%-8% though harvesters observe significant

⁹ <http://assembly.nl.ca/Legislation/sr/statutes/l01.htm>

¹⁰ <http://www.assembly.nl.ca/legislation/sr/statutes/f18.htm>

differences during tests on different beds and different times of the year. A brief review of slips provided by one producer indicated that yield varied substantially from different harvesters and area of harvest, which is quantified by the yield variability from weekly production reports.

Conclusion: *Harvesters believe there is a lack of transparency in the purchasing method and means of determining value.*

To address pricing transparency, harvesters consulted unanimously support implementing some method of grading. Most parties felt the program is best delivered by grading at the plant in order to reduce costs and where a suitable grading environment exists.

Science: There is no formal scientific survey of sea urchins in NL, and there is no consistent collection of data that would form a proxy for abundance, maturity, or growth of sea urchins. Given that harvesters expressed concern regarding a downward trend in size, indicating significant fishing pressure on older urchins, gathering some benchmark data would permit monitoring changes to the stock in the future. Some observations from harvesters are provided that indicate the possible scope of research required to develop a stock benchmark against which to measure.

- Each bed encountered is different in terms of abundance, size and maturity of urchins.
- Normally a bed is harvested twice per year, though it is acknowledged that some beds are harvested more frequently, five or six times.
- Some beds only have small urchins and are never harvested. The reason for lack of growth or whether the urchins move prior to growing is unknown.
- Observations by divers indicate that the Bay of Exploits may have encountered a kill as there is very suitable habitat; however, no urchins have been observed in the area.
- Urchins in beds that have more current and/or tide have much thicker shells, resulting in lower roe yields.
- Harvesters target the large, up to 40 year old, urchins. However, the abundance of these larger urchins appears to be declining. It is estimated that a 48mm, legal size, urchin in NL waters may be a 15-20 year old urchin.

Aging work has been ongoing at Bowdoin College in Maine¹¹. They have established a means of determining age using fluorochromes such as tetracycline and calcein and it is now being used at a hatchery facility in Franklin, Maine¹². This aging method may be used as a means of determining the age structure of the

¹¹ <http://collegenews.org/research-publication/2007/bowdoin-researchers-develop-bar-code-for-sea-urchins.html>

¹² Telephone conversation April 11, 2014 with Amy Johnson, Bowdoin College, Maine

urchin stock.

- Disease has resulted in several kills in other regions in the past. In Nova Scotia, mass mortalities of urchins have been caused by outbreaks of amoebic disease (paramoebiasis) associated with tropical cyclones of high intensity passing by the coast. It appears that the increase in incidences of the disease over the past few decades is linked to ocean climate change¹³.

Conclusion: *The observed decline in size of urchins harvested should be quantified through a structured fishery dependent science program.*

Diver Certification Cost: Diving for sea urchins is a skill developed over time and is a dangerous occupation. All divers must have formal training and experience prior to being certified for urchin diving. The training and certification requirements include:

- **Basic scuba:** A training course is provided that gives practical classroom and 20 hours of dive experience both in a pool and at least one open ocean dive.

Cost: \$700 per diver for the course plus the cost for gear, including a snorkel, mask and fins. The training institute normally provides dive suits.

- **Ocean diving:** A three-week ocean diving course was provided in 2013. An instructor from outside NL provided the course to 10 individuals, all of who passed the course and were subsequently certified by Occupational Health and Safety (OH&S).

Cost: \$10,000 per diver.

- **Urchin diving:** To be an urchin diver pursuing the fishery for the whole season requires a significant investment by each diver. They must be equipped with at least one dry suit, 4-8 tanks, two regulators, and ancillary equipment.

Cost: \$3,500-\$5,000 per diver.

Every diver certified for sea urchin harvesting has made a significant investment in training and equipment, ~\$15,000. Further, each diver has dedicated a significant amount of time to receiving his or her certification, which may have resulted in lost income for at least three weeks.

Enterprise Outfitting Cost: Each licensed harvester must equip his or her vessel to accommodate urchin harvesting. Some harvesters hold other licenses and have a vessel for that purpose; however, there are many licensed harvesters for which sea urchin harvesting is their primary occupation. The outfitting costs for these dedicated harvesters are provided:

¹³<http://www.int-res.com/articles/meps/152/m152p155.pdf> and http://www.aslo.org/lo/toc/vol_55/issue_6/2331.pdf

- **License:** Currently, a license costs from \$26,000-\$45,000
- **Vessel:** An inshore vessel equipped with two outboard motors and a trailer is required, costing \$40,000-\$50,000.
- **Equipment:** Operating equipment including a compressor and at least three sets of diving gear, costing \$15,000 or more.

The total estimated cost for a new entrant who is already an OH&S certified diver is \$81,000-\$110,000.

3.2 Processing Sector

The Operators: There are currently three processing operations in the province, Hodder Shellfish, Wood-Pick Enterprises, and Terra Vista.

Hodder Shellfish was licensed in 2013 and currently operates from a leased plant in Carmanville. The intention of the operator is to establish a permanent processing facility in Stoneville. Operations commenced November 5, 2013 after equipment was purchased and staff was trained.

Wood-Pick Enterprises is located in Wareham and has been licensed to produce sea urchins for the entire period of review. This operation is one of the original sea urchin processing facilities, established in 1995.

Terra Vista Ltd is located in Glovertown and obtained a license in 2012. The facility used for sea urchin processing traditionally processes snow crab and while there may be some automated transfers in place, this may have a negative impact on quality and yield.

Production Capacity: There are several factors that determine the overall processing capacity of the sector. These include but are not limited to:

- **Size of the raw material:** Whereas each urchin is individually handled, plant capacity is dictated how many by units per hour rather than pounds per hour are handled; the larger the urchin the more whole pounds per hour produced.

Buyers and producers stated that they have received shipment of 5%-10% undersize, which is unusable due to the roe size. Further, when shipping live to Main for processing a load can be detained or rejected at the border if undersize urchins are identified in the load.

- **Roe yield:** Roe content varies area to area and within a specific area depending on where the urchins are being harvested, and how many times an area is harvested in a year. Weekly reports and audit results indicate yields vary significantly trip to trip, indicating that diver and license holder experience is a factor.

All producers stated that a minimum 8% yield is required to realize the best value. Further, it was observed that urchins that have a low yield or provide only small pieces of roe, could be lost during processing. Under current supply conditions a

yield loss of 1.0%-1.5% appears common, and very small urchins or low roe content urchins losses will incur a higher loss, 2.0%.

- **Workforce:** The workforce in the urchin sector is younger, estimated average age <40 years, than the processing sector as a whole, ~55 years, which should result in relatively good throughput rates. The ‘NL Productivity Handbook’ indicates labour costs, at \$13 per hour, should be \$6.16 for packing 100g tray packs. Overall, producer labour costs are estimated at \$6.99, 13% higher than standard, and the one producer packing 100g trays have labour 50% higher than standard.

Shore Pricing: Each incoming lot from a harvester is kept separate from point of pickup until all urchins are processed. Prices paid to harvesters by producers are determined as follows:

- Gross weight is determined at the wharf or plant and includes a 9-12 pound pan weight.
- Net weight, used as input weight for yield determination, is the gross weight less the pan weight less 5% water allowance. Water is retained in the urchins and is apparently lost immediately upon cracking.
- Per each yield point the benchmark price in 2013/14 is \$0.10 per 1% of yield packed out. Therefore, if a 10% yield is realized the harvester received \$1.00 per pound based on net weight received. Apparently, higher yielding urchins are worth a premium, as one producer stated if a 12% yield was achieved it would be \$0.12 per yield point, or \$1.44 per pound.

Grading: All three producers support having a grading system in place. Some of the purchasing standards suggested by producers include:

- Minimum 8% yield recovery.
- Minimum size should be larger at either 2” or the same as Maine

Shipping Out: All producers concur that shipping out of whole product should be permitted under certain conditions. Two of the operators indicated that once the full processing capacity was met, then they should be permitted to export all excess supplies. All producers generally agreed that the current 50% export allowance, if measured on a seasonal basis, provides a good balance.

Capitalization: Two of the operators indicated that they would like to make further investment in processing operations; however, they need more certainty regarding buyer and processor policy prior to make these investments.

4.0

ECONOMIC ASSESSMENT

The following provides an economic assessment for sea urchin harvesting and processing in NL. This assessment examines four scenarios described as follows:

- **Scenario 1:** Landed volume based on 2013/14 weekly reports, with live sales of 50%. Whereas harvesters stated they could not harvest some days due to oversupply to plants, this scenario represents the minimum threshold for harvesting activity.
- **Scenario 2:** 2013/14 landed volumes increased 27.7% to account for average estimated unreported activity as calculated for 2011-2013. Live sales of 50%. This scenario is intended to reflect unreported landings activity; however, with the revised reporting system and auditing activities in place for 2013/14, this may overstate the actual estimated harvesting and processing efforts.
- **Scenario 3:** Estimated landings based on 2012/13 number of active vessels per month harvesting every day available. This scenario is intended to reflect the harvesting activities if the limitations during the 2013/14 season did not exist.
- **Scenario 4:** Estimated landings based on 25% average license utilization harvesting every day available. This scenario likely represents the upper threshold for harvesting activity; further, this volume of landings provides very high utilization of available processing capacity.

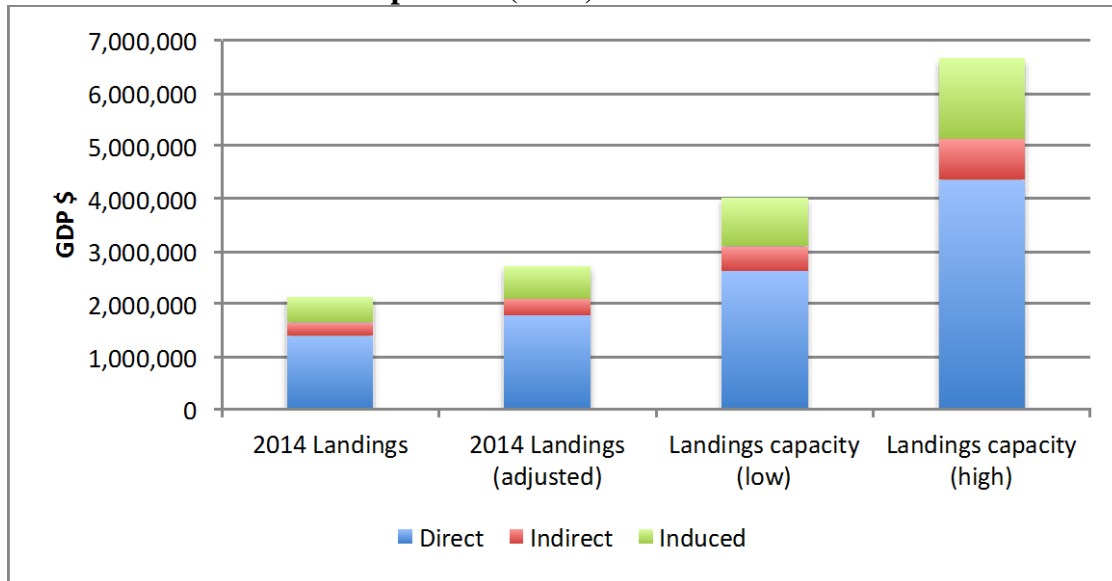
The assumptions used for examination of gross domestic product (GDP) and labour benefits for the four scenarios include:

Exhibit 4.1: Assumptions used for economic assessment

	Production	Whole Export
Shore price	\$0.85	\$0.85
Shore price benefits	7%	7%
Supply (whole pounds)	Scenario 1 – 0.59m Scenario 2 – 0.76m Scenario 3 – 1.12m Scenario 4 – 1.85m	Scenario 1 - 1.19m Scenario 2 - 1.51m Scenario 3 – 2.23m Scenario 4 – 3.71m
Yield	7.2%	100%
Production – whole pounds per person hour	18.7 - 100g tray pack 33.3 - wetpack 25.9 - average	
Income - processing	\$13.00 incl. 11% benefits	Divers 50% share plus 80% of license holders 50% share.
Person year equivalent	1,750 hours	\$20,000

The estimated GDP of activity related to the sea urchin fishery in 2013/14 is a minimum of \$2m and maximum of \$2.7m. The maximum GDP that could be realized by the sector, with current processing capacity, is estimated to be \$4.0-\$6.6m. Direct GDP for the fishery comprises 65% of the benefits and indirect and induced benefits comprise 35%.

Exhibit 4.2: Gross domestic product (GDP)

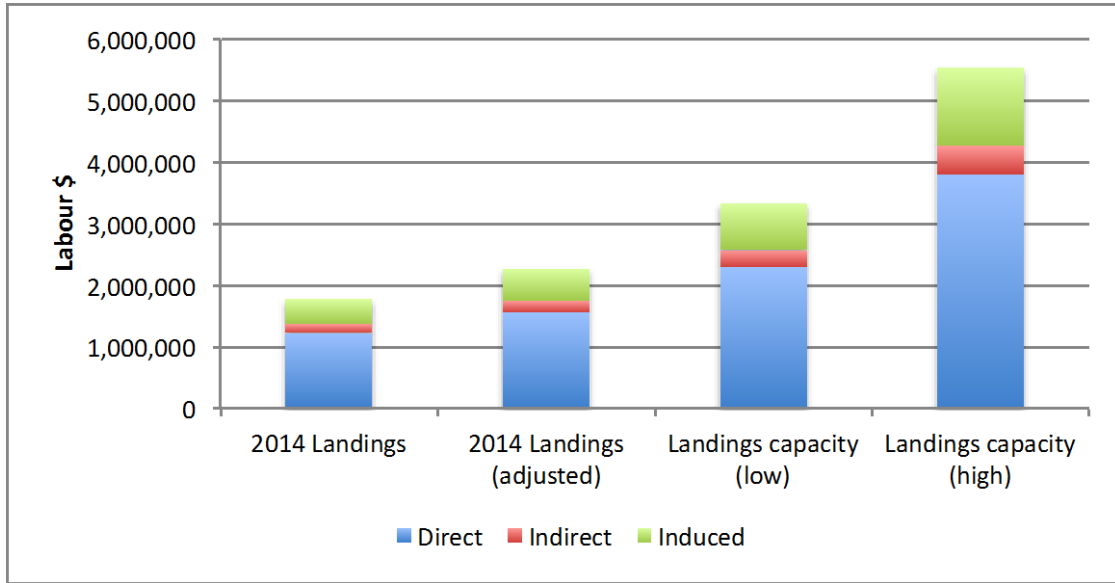


Sea urchin harvesting and processing is very labour intensive. Vessel operating costs are low as harvesting is done very near shore and the vessel is stationary while harvesting occurs. This results in labour being the primary cost for the fishery, estimated at \$0.64 per whole pound.

Processing activity is very labour intensive and requires little investment in capital equipment compared to processing activities for other species. Direct processing labour is ~\$6.99 per finished pound or \$0.50 per whole pound.

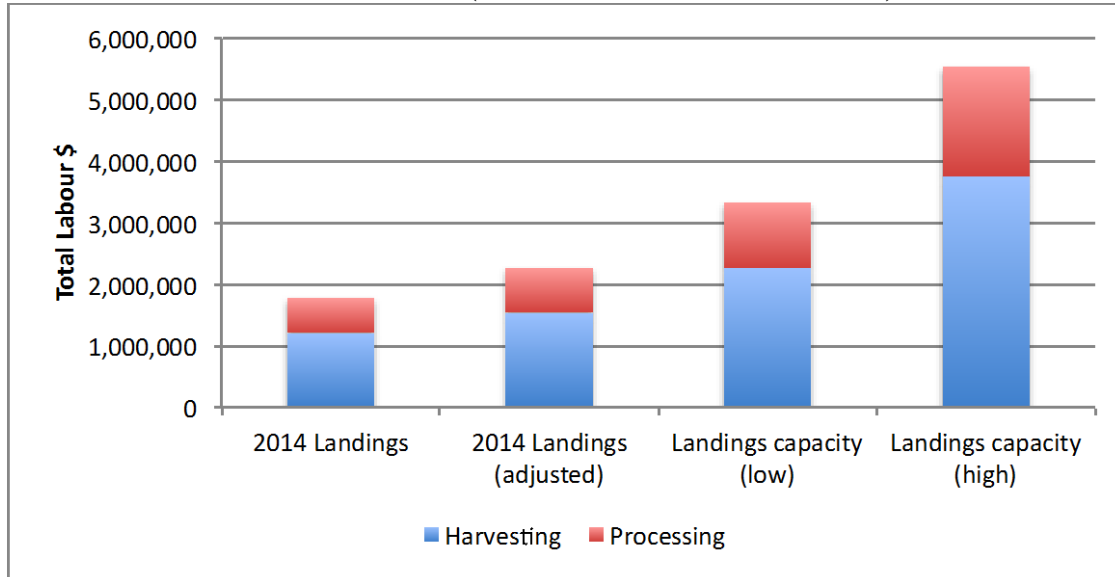
In the 2013/14 season it is estimated that the direct labour realized was \$1.2m-\$1.5m and spinoffs from indirect and induced benefits provided 31% more labour activity. The maximum level of total labour activity that could be supported by this fisher is estimated to be \$3.3m-\$5.5m.

Exhibit 4.3: Total labour benefits



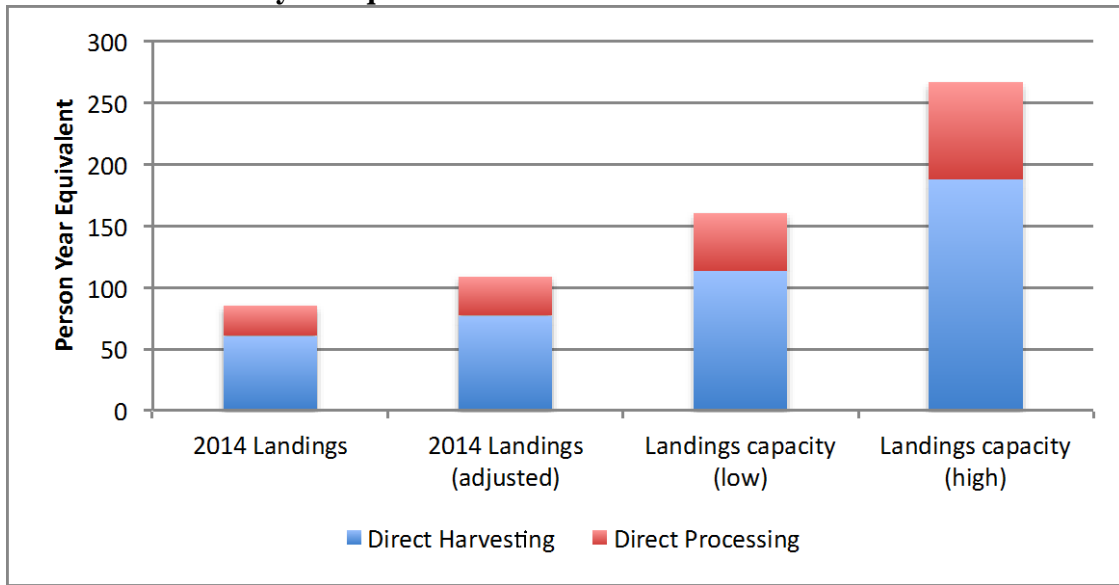
The following exhibit illustrates the labour benefits realized from both the harvesting and processing sector. In all cases it has been estimated that 50% of all landings would be directed to processing, with the remaining resources being exported live. As indicated in this exhibit, the harvesting labour benefits provide the 68% of the total labour activity.

Exhibit 4.4: Total labour benefits (indirect and induced included)



The person year equivalent labour content is estimated to be 85-109 at current activity levels. The upper levels for the urchin sector may provide 160-266 full-time equivalent positions.

Exhibit 4.5: Person year equivalent



5.0 LEGISLATION AND POLICY

Seafood trade is an intensively competitive international business; as such, seafood suppliers must meet requirements of end users in order to maintain their competitive position. The Minister recognizes this and provides exemptions in order to meet these changing needs.

The sea urchin processing sector has received exemptions, permitting shipping of whole sea urchins in 2013. Further, outside buyers were licensed to purchase directly from harvesters from 2010-2012. Whole sea urchins that are shipped from NL are delivered to one of four producers in Maine for processing.

5.1 NL Legislation, Regulations and Supporting Policy

Relevant legislation and regulations with respect to the purchasing and processing of sea urchins can be found in the Fish Inspection Act, Amended: 1994 c38; 1996 c26; 1997 c13 s23; 2004 cL-3.1 s35; 2004 c36 s14; 2004 c43; 2005 c49; 2006 c40 s8; 2006 c45; 2011 c23; the Fish Inspection Administrative Regulations under the Fish Inspection Act (O.C.2007-293); and the Fish Inspection Operations Regulations under the Fish Inspection Act. The following is an outline of the line of authority that applies to the upholding minimum processing requirements for sea urchin.

The legislative authority regarding buying and processing sea urchins is found in the Fish Inspection Act, as follows:

4. (1) The Lieutenant-Governor in Council may make regulations:
 - (a) requiring and providing for the licensing of persons engaged in the buying, handling, storing, grading, processing, transporting or marketing of fish or marine plants;
 - (b) providing for the licensing of establishments used in or in connection with the buying, handling, processing, storing, grading, transportation or marketing of fish or marine plants;¹⁴

Section 3 (3) of the Fish Inspection Administrative Regulations states that:

Except as otherwise provided in section 4 a person shall not engage in or engage in a specific aspect of, processing except under authorization of a fish processing license issued by the minister.

and Section 5(2) states that:

A fish buyer's license or a fish processing license may be issued by the minister upon the terms and conditions that the minister considers necessary and advisable,

¹⁴ <http://www.assembly.nl.ca/legislation/sr/statutes/f12.htm>

including terms and conditions not related to quality, and the minister may prescribe and attach different conditions to fish buyer's licenses or fish processing licenses in respect of different areas of the province.

7. (1) A fish processing license issued by the minister may be of one of the following classes:

(a) a primary processing license under which the holder of the license shall comply with the minimum processing requirements set out in the Schedule to the *Fish Inspection Operations Regulations* or such other minimum processing requirements as are approved in advance in writing by the minister;¹⁵

The application of the minimum processing requirements are set out in the Fish Inspection Operations Regulations and its Schedule as follows:

Duties of fish processor

15. (1) The holder of a fish processing license shall comply with

(a) the minimum processing requirements applicable to an authorized species as set out in the Schedule or other alternative minimum processing requirements approved in writing in advance by the minister except where the minister has issued an exemption in writing; and

(b) reporting requirements, including production records, established by the minister in the form and manner and at the frequency prescribed by the minister.

(2) For purposes of paragraph (1)(a), "authorized species" means a species that is authorized to be processed by the conditions, including any supplemental conditions, of the fish processing license.

(3) A production record referred to in paragraph (1)(b) shall be retained by the holder of a fish processing license for a period of not less than 5 years.

The minimum processing requirements, set out in the Schedule to the Fish Inspection Operations Regulations, for sea urchin require the gonads to be removed.¹⁶

As the preceding indicates that the Lieutenant-Governor in Council can make regulation around the licensing of fish buying and processing and one must possess a license issued by the Minister in order legally operate. The Minister can issue a license with specific stipulations if required and the license holder must comply with the minimum processing requirements or alternative requirement (exemptions) approved by the Minister.

¹⁵ <http://www.assembly.nl.ca/Legislation/sr/Regulations/rc070074.htm>

¹⁶ <http://www.assembly.nl.ca/Legislation/sr/Regulations/rc070076.htm>

5.2 Policy Changes Timeline

The following exhibit provides a summary of the policy changes that have occurred over the period reviewed and the associated outcomes, using publicly available sources of information. As illustrated, significant changes have occurred since the outside buyers were initially licensed in 2010. Coupled with two new active producers, the outcomes have been positive in terms of shore price and economic value from the urchin fishery.

Exhibit 5.1: Timeline of legislation, policy and activity

Year	Active Plants	Licensed Plants	Licensed Buyers	Legislative or license changes
2004	2	5		
2005	4	10		
2006	4	5		Review of minimum processing requirements
2007	4	4		
2008	3	3		
2009	2	3	2	
2010	1	1	3	Three companies licenses to buy, TKG, Fresh Atlantic and East Atlantic
2011	1	1	3	Outside buying very active
2012	2	2	2	Buyer licensing suspended November 50/50 rule prior to Dec 24, then 75/25 rule
2013	3	3	0	
2014				Harvester strike January, 50/50 rule January 29, severe weather conditions

Conclusion: *There have been positive economic impacts due to DFA policy changes since 2009.*

5.3 Federal Urchin Licensing Policy

Licenses are issued annually to qualified harvesters by the Department of Fisheries and Oceans (DFO). The sea urchin fishery is managed by conditions stated in the license issued, Appendix II. There is no Integrated Fisheries Management Plan developed for this fishery to provide guidance regarding management of the fishery.

Following is a summary of the condition of license for sea urchin harvesting in NL.

- Fishing area is as per the Lobster Fishing Area (LFA) of the harvester.
- Fishing gear, SCUBA Diving (maximum 4 divers authorized per license).
- Only vessels less than 19.8m (65') and registered with DFO.

- The minimum retention size is 48mm (1 ^{7/8}"") in diameter as measured inside the spines.
- Fishing seasons are LFA 2 - June 25 to November 30, LFA 5, 6, 12 - October 01 to April 30, LFA 4, 7, 8, 9, 10, 11 - September 1 to April 30.
- This fishery is subject to at-sea observer coverage.

During consultations there were several issues raised and recommendations put forward regarding federal licensing policy, as follows:

- **Minimum size:** Currently the minimum size is 48mm, which is smaller than the preferred size by producers, 51mm, and than the minimum import size requirement into Maine, 52.3mm.
- **Season:** Several harvesters and some producers support a later opening to the fishery as it is postulated that yields are lower in September and October than later in the year. Review of information suggests that yields are quite variable throughout the year, and there is landings early in the season that provide acceptable, 8% or higher, yields.

Many suggested that the opening date for an area should be determined through roe sampling which results in a minimum 8% yield. This is similar to how other roe fisheries such as herring or capelin operate. This would require some significant effort to implement and it may best be accomplished through a purchasing standard.

- **License access:** There are numerous unused harvesting licensing, and there has been little activity on the south coast and Avalon face. Current active harvesters have sought access to fish in these areas. Apparently, to gain access to a license not currently used there is a lease offer of 15% of landed value. Licensing policy requires that the enterprise owner must be present on the vessel during harvesting, unless unavailable for a justifiable reason.

Further, harvesters stated that they would have to use the enterprise holders vessel. In policy this is not required, as any license can be transferred to any vessel as long as it falls within the vessel class of the license.

- **Observer coverage:** Harvesters indicated that while at-sea observer coverage is required and that they pay for it each season, there has not been any coverage. If indeed this is determined to be the fact, either observers should be deployed in accordance with the services paid for, or the requirement for observer coverage should be removed from the license condition.

Conclusion: *If comments from harvesters are quantified, DFO should consider changes to some license conditions and licensing policy.*

5.4 Stakeholder Proposed Policy Alternatives

It is acknowledged by most industry stakeholders that the sea urchin sector has changed significantly over the past 10 years, and there are challenges related to developing appropriate long term policy for the sector. Harvesters clearly understand that the processing sector must be supported; however, it was also stated that not being permitted to fish when processing capacity and export limitations cannot meet the supply available is not acceptable. The harvesters proposed policy options they feel would meet their needs, including:

- Permit outside buyers access to buy all sea urchins under condition that they supply plants prior to shipping out of province.

Outcome: This suggestion may provide a shore price premium for live urchin exported by permitting outside buyers to pay harvesters directly. However, this poses significant monitoring issues and given the current relationship between buyers and producers, this may not provide price premiums previously realized by harvesters.

- Supply plants first, based on pre-determined capacity, then sell as much as available direct to outside buyers.

Outcome: This option would require significant efforts as harvesting and processing activity would both have to be actively monitored, such as through a coordination centre. Further, harvesters may not be treated equally depending on how the policy is implemented. For example, if a weekly production threshold is established and all harvesters must sell to producers until this threshold is achieved, then some harvesters may choose to fish only once the threshold has been realized, therefore obtaining a higher average price, if selling to outside buyers provides a price premium.

- Audit plants to ensure an equitable price is paid to harvesters based on sales returns.

Outcome: This option would necessitate having a market to shore price model, similar to the snow crab (Sackton) formula, to ensure that harvesters realize a 'fair' value based on varying market prices and exchange rates. There would need to be significant effort by DFA in order to gather representative market information from Japan, which is currently not available, in adequate detail to establish a market to shore relationship.

Alternatively export value could be used rather than Japanese import or sales prices. However, export values are those claimed by producers, and the fact producers are all aligned with Maine producers in some manner permits the opportunity to move profit from one operating unit to another. This could result in devaluing exports artificially in order to reduce shore prices.

- Offer first trip of the week to producers and all subsequent trips can be sold to an

outside buyer.

Outcome: Active monitoring of fishing activity would be required in order to ensure that all harvesters offer their first landing of the week to producers. Further, in times when fewer harvesters are active production capacity would exceed the supply offered given the current number of active licenses.

- Individually commit 25% of harvest to plants.

Outcome: This is very similar to the prior option.

Producers unanimously stated that the 50% export allowance works well, allowing them to maximize production without limiting harvester activity. Flexibility in the policy must permit the export allowance to be measured on an annual basis. Further, severe weather conditions, such as the extreme cold weather and ice conditions in 2014, should be given consideration when monitoring against the export allowance.

Conclusion: *Harvesters offered many policy alternatives in order to re-establish a direct sale to buyers, whereas producers appear satisfied with the current 50/50 policy.*

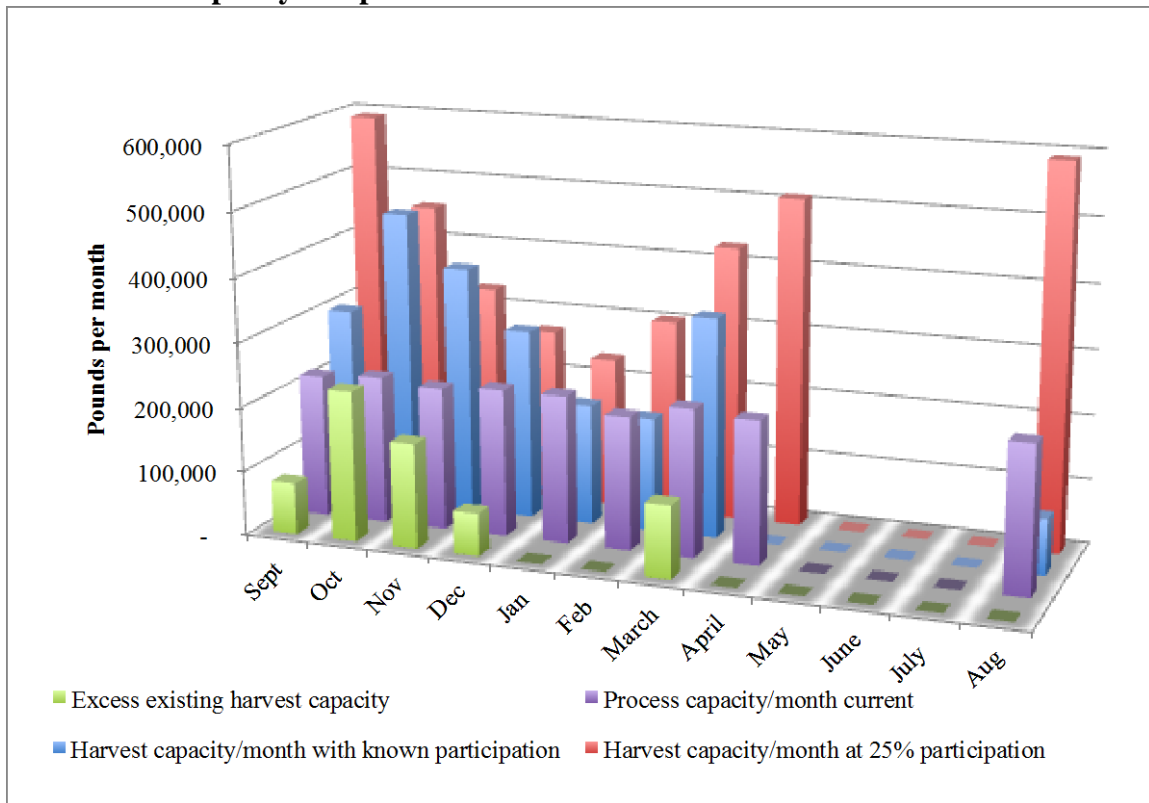
6.0 FINDINGS & RECOMMENDATIONS

6.1 Capacity Matching

The following analysis indicates that current supply levels exceed the existing processing capacity in the province. This analysis considers some key factors including:

- Capacity matching is determined weekly to reflect holding duration for live urchin. The analysis outcome however, is presented monthly for ease of presentation.
- Harvesting capacity is extremely variable depending primarily upon the number of active divers, weather conditions, stock abundance and urchin size. An analysis using existing license participation rates with four divers was completed; however, both size vessel restrictions and concerns regarding stock abundance does not support this option. Alternatively, a 25% participation rate across all months is presented and is possible if other fishing areas are pursued.
- Processing capacity is based on calculated throughput rates, and staffing levels observed and quantified through weekly reports. Producers did state that additional workers were available; however, there is no means to confirm this statement.
- Processing capacities can change based on pack type, tray or wetpack.

Exhibit 6.1: Capacity comparison



Findings from this analysis include:

- Excess capacity, determined by known harvest participation rates and processing capacity, exists only in months when weather conditions do not significantly curtail fishing effort.
- The annual excess harvesting capacity is calculated to be ~650,000 pounds. However, given there are unreported landings of at least 330,000 pounds and harvesters could not fish at certain times under current policy, 1.0-1.1m pounds of excess harvest capacity seems likely.
- Annual processing capacity is ~2.0m pounds assuming that landings match with ability to process throughout the year. Therefore, the nominal capacity would be somewhat less.
- Annually it is estimated that existing annual harvest capacity exceeds processing capacity by one-third. On a monthly basis however, processing capacity is exceeded by 100%, 74% and 49% in October, November and March respectively. This necessitates either a live urchin export policy which would accommodate seasonal variation or be measured on an annual basis.

The economic assessment indicates that maximum value from the resource is realized when existing processing capacity is optimized and supply exceeding this capacity can be exported live. Therefore it is important for industry growth and economic return that balance is struck which maximizes harvesting activity while providing meaningful employment to plant workers. This necessitates a policy that permits shipping out live urchins during periods when supply exceeds a pre-established production threshold. The following guidance to policy for the 2014/15 season is provided:

- All landings should continue to go through registered plants in NL. This permits effective monitoring of activities without the need to deploy additional inspector resources. Though harvesters may perceive plants will extract more than a fair value for handling the product, in reality these plants are aligned so closely with Maine producers that prices should remain consistent regardless if shipped direct or handled through a plant.
- The 50/50 formula should remain in place and be measured on an annual basis. Flexibility on how much to export and when should be given to the producer in order to meet various supply scenarios. This provides a policy which is easy to monitor and should be reasonably easy to enforce if identified landings variances can be reduced or eliminated.
- Any buying and processing policy should remain in place for a three year period in order to provide the necessary stability to permit both harvesters and producers to make capital investments in support of the sector.

6.2 Transparency in Price Setting

All industry stakeholders that participated in consultations agreed that a transparent and consistent method for determining price is required.

- An independent grading system should be established, permitting a clear means for both harvesters and producers to establish value of each shipment of urchins. The basic framework for such a grading system has been provided, Appendix VII.
- A working group consisting of harvesters, processors and government representatives should immediately be established to develop draft grading standards and price setting mechanisms.
- A pilot project should be completed during September and October 2014 to assess the grading standards and obtain feedback from stakeholders. The final grading standards and pricing mechanisms should be put in place for December 2014.
- The working group should remain in place to evaluate the program at the end of the year and provide input for future direction.

6.3 Stock Benchmarking Program

It is apparent from a literature review and industry consultations that no current scientific information regarding the sea urchin stock in NL is available. The management of the fishery, other than licensing and landings statistics, is fundamentally unregulated. There is no requirement for verification of weights at dockside, and though observer coverage is required by license condition, there has been no independent at-sea verification of catch.

Currently, the only formal information gathered on landings is by the DFA inspector on the Northeast coast. The information gathered, though of some value, does not contribute much needed information regarding stock structure by bed or fishing area.

The following provides some discussion points which should be reviewed by DFA in conjunction with harvesters and DFO in order to develop a stock benchmarking program. DFO expertise and resources will be required in order to ensure the program meets scientific standard requirements and to provide resources to analyze the results of a research program. If a grading program is implemented, much of the required information may be obtained from that source.

- Map the location and estimated size of sea urchin beds in each fishing area.
- Determine a method of measuring abundance of each bed. This could include using a 1m² grid that would be placed on the leading edge of the urchin bed and the number of urchins counted.
- Using a statistically valid sampling plan, measure a random sample of urchins from each landing, identifying the bed area and date of harvest. This information can be used to monitor the change in size over time. Further, data should be

collected from these same samples to determine sex, sexual maturity and egg clutch size. This information can provide sex ratios, maturity indicators, and an egg production abundance indicator.

- Implement an experimental fishing program which permits harvesters to sample areas that have not been fished in recent years. Estimates of urchin bed sizes and urchin sizes should be the minimum precondition to permitting experimental fishing. This program may identify commercial fishing areas and contribute information to determine overall stock abundance for the region.

6.4 Provincial Fisheries Data Improvement

Information improvements have been realized by recent changes to processor license conditions and initiatives by DFA including:

- Requirement that all live exports of sea urchins be completed through a processing facility.
- Weekly reporting of purchases, exports, roe production and labour.
- Auditing of purchase and production records to ensure compliance.

These compliance initiatives have improved information accuracy; however, variances of weekly reports compared to audit findings, and prior year monthly reports compared to landings data and export information, indicate that much activity remains unreported. A full review of weekly reports, audit findings and export data for the current year should be completed in order to determine if there is still any level of misreporting. If variances still exist, further measures should be implemented to improve accuracy of both landings and production data.

6.5 Federal License Policy Changes

To effectively work with DFO to implement license or policy changes, the provincial government should participate and support establishing a working group including harvesters and producers. The objective of this working group would be to develop a position paper on each of the following issues to present and discuss with DFO.

- Change the minimum acceptable size to at least 2” and ideally aligned with the Maine requirement of $2^{1/16}$.
- If a grading scheme incorporating minimum yields is not implemented, define a means of triggering area openings based on a pre-defined minimum roe yield.
- Engage DFO to clarify confusion related to license transfers and vessel operator policy. The objective would be to develop some fishing activity in currently unfished areas in order to maximum utilization of the resource and have the ability to move current fishing effort to reduce fishing pressure on urchin stocks in some areas.

APPENDIX I

CONTACTS

Industry Consultation					
Name	Occupation		Port	Phone	Email
	Diver	Skipper			
Harvesters					
Dion Chaulk	x		Charlottetown	664-5241	dion.althea@gmail.com
Robert Linfield				256-9422	
Bert Lambert		x	Twillingate	884-2622	
Bruce Watkins		x	Herring Neck	628-7475	
Lloyd Phillips		x	Random Island		lloyd.nl@gmail.com
Dennis Chaulk	x	x	Charlottetown	644-5541	dennischaulk@eastlink.ca
Larry Parsons		x	Lumdsden	530-2602	larryp@nf.sympatico.ca
Jason Burton		x	Greenspond	269-2114	Pen.Jason@Hotmail.com
Glenn Moulard		x	Newtown	536-8450	
Gerald Hussey	x		Bonavista	468-2148	gerald.hussey@nf.sympatico.ca
Rick Hicks		x	Bonavista	468-2219	RickyHicks@Hotmail.com
John Boland			FFAW	743-6063	johnboland@nf.aibn.com
Shawn During	x		Bonavista	725-6467	duringdiving@gmail.com
Outside Buyers					
Sinoun Chau			East Atlantic Seafood	207-899-6555	
Cindy Elliot			Fresh Atlantic Seafood Inc.	506-755-2689	
Processors					
Jerry Hodder			Hodders Shellfish Inc.		
Andrew Akerman			Wood-Pick Enterprises Ltd	687-2848	
Vaden Oram			Terra Vista Limited	533-3337	

APPENDIX II LICENSE CONDITIONS

2014 Sea Urchin Condition

Pursuant to Sub-Section 22(1) of the Fisheries (General) Regulations, this Sea Urchin licence is subject to the following conditions:

These licence conditions are subject to any prohibitions, directions, or requirements that have been imposed on you by way of an order of a Court under section 79.2 of the Fisheries Act.

FISHING AREA

1. This licence is valid for Lobster Fishing Area (s) (LFA) \$\$LFA\$\$.

FISHING GEAR

2. You are authorized to fish Sea Urchins by Scuba Diving.
3. A maximum number of four (4) divers are authorized under this licence.

FISHING VESSELS

4. Only vessels less than 19.8 m (65 ft) and registered with Fisheries and Oceans, Canada by the licence holder are authorized to operate under this licence.
5. A maximum of three (3) vessels may be used under this licence.
6. Vessels operating under the authority of this licence are required to operate within 500 meters of each other during Sea Urchin fishing operations.

CATCH LIMITS

7. You shall not possess Sea Urchins less than 48 mm (1 7/8") in diameter (inside spines).

FISHING RESTRICTIONS

8. The season opening and closing dates for this fishery are as follows:
 8. (1) LFA 2 – June 25 to November 30
 8. (2) LFA 5, 6, 12 – 01 Oct to April 30
 8. (3) LFA 4, 7, 8, 9, 10, 11 - September 1 to April 30
9. Diving for Sea Urchin is not authorized during that part of any day commencing one half hour after sunset and ending one half hour before sunrise on the following day.
10. The licence holder or designate must be present at all times during fishing activity and must be present for the offloading of the vessel.
11. Fishing is not authorized within the area bounded by the following co-ordinates as follows: Peter's Cove (Clode Sound), Bonavista Bay

48° 24 minutes 48 seconds North, 54° 01 minutes 23 seconds West,
48° 24 minutes 29 seconds North, 54° 02 minutes 28 seconds West,

48° 24 minutes 25 seconds North, 54° 02 minutes 28 seconds West,
48° 24 minutes 43.5 seconds North, 54° 01 minutes 26 seconds West

MONITORING - AT-SEA OBSERVER COVERAGE

12. The Sea Urchin fishery is subject to at-sea observer coverage. These licence conditions are not valid until at-sea observer coverage has been arranged and confirmed, as outlined in the "Letter of Arrangement" issued by an At-Sea Observer Corporation, designated by the Newfoundland and Labrador Region, Fisheries and Oceans Canada. This "Letter of Arrangement" must be attached to the licence document in order to validate the licence.

13. While operating under this licence in waters to which the Atlantic Fisheries Regulations apply, you shall abide by the conditions as outlined in Schedule 5, Observer Coverage Requirements.

INCIDENTAL CATCH

14. You are not permitted to harvest, retain or transport any other species during Sea Urchin fishing operations (same fishing trip).

SPECIES AT RISK

15. In accordance with the recovery strategies for the Northern Wolffish (*Anarhichas Denticulatus*), Spotted Wolffish (*Anarhichas Minor*) and Leatherback Turtle (*Dermochelys coriacea*), the licence holder/operator is authorized to carry out commercial fishing activities authorized under the Fisheries Act that may incidentally kill, harm, harass, capture or take the Northern Wolffish, Spotted Wolffish or Leatherback Turtle, as per subsection 83(4) of Species At Risk Act (SARA).

The following conditions apply:

15. (1) This permission is only valid while commercial fishing is conducted under the licence issued to you under the Fisheries Act in all authorized waters under this licence.

15.(2) The licence holder/operator is required to ensure that, while the fishing activities are conducted, every person on board the vessel who incidentally catches a Northern Wolffish, Spotted Wolffish or Leatherback Turtle forthwith returns it to the place from which it was taken, and where it is alive, in a manner that causes it the least harm.

15. (3) The licence holder/operator is required to provide information regarding interactions with species at risk while conducting fishing operations; you are required to report any interaction to Northern Wolffish, Spotted Wolffish or Leatherback Turtle in a logbook if applicable.

Source: DFO

Sea Urchin Licence Holders

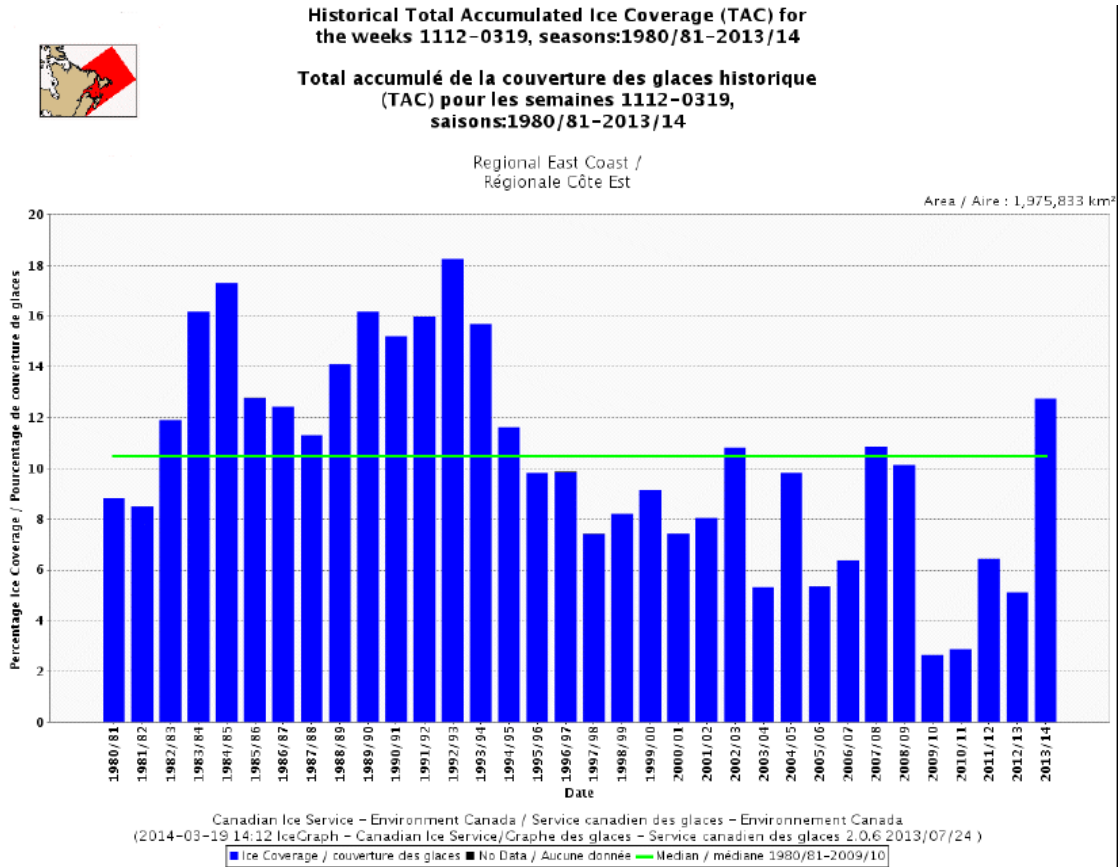
data as of March 26, 2014

Salutation	First Name	Surname	Licence #	Gear Desc	Quota Area	Qual 1	Qual 2
MR.	HARRISON	CAMPBELL	66322	SCUBA DIVING	02	2J	LFA 2
MR.	EARL ALBERT	STONE	66318	SCUBA DIVING	02	2J	LFA 2
MR.	GADEN JOHN	DYSON	66321	SCUBA DIVING	02	2J	LFA 2
MR.	ALBERT FRANCIS	DYSON	66323	SCUBA DIVING	02	2J	LFA 2
MR.	ALEXANDER JR	ELSON	63388	SCUBA DIVING	02	2J	LFA 2
MR.	DARRYL	BURDETT	63389	SCUBA DIVING	02	2J	LFA 2
MR.	ANTHONY	WHEELER	63371	SCUBA DIVING	04	3K	LFA 4
MR.	FLOYD	MEHANEY	63349	SCUBA DIVING	04	3K	LFA 4
MR.	BERT	LAMBERT	63347	SCUBA DIVING	04	3K	LFA 4
MR.	ROBERT	LINFIELD	63351	SCUBA DIVING	04	3K	LFA 4
MR.	RICHARD	GILLET	63352	SCUBA DIVING	04	3K	LFA 4
MR.	BRUCE LLOYD	WATKINS	63370	SCUBA DIVING	04	3K	LFA 4
MR.	ROBERT J	HURLEY	63366	SCUBA DIVING	04	3K	LFA 4
MR.	WAYNE	FUDGE	63348	SCUBA DIVING	04	3K	LFA 4
MR.	DEREK	BENNETT	63368	SCUBA DIVING	04	3K	LFA 4
MR.	JERRY	HODDER	63367	SCUBA DIVING	04	3K	LFA 4
MR.	EDDIE D	CUFF	63369	SCUBA DIVING	04	3K	LFA 4
MR.	LARRY HOWARD	PARSONS	63356	SCUBA DIVING	04	3K	LFA 4
MR.	GREGORY BS	GILL	63372	SCUBA DIVING	05	3L	LFA 5
MR.	DONALD B	MOULAND	63690	SCUBA DIVING	05	3L	LFA 5
MR.	DAVID	TILLER	63342	SCUBA DIVING	05	3L	LFA 5
MR.	EDWARD PAUL	TILLER	63340	SCUBA DIVING	05	3L	LFA 5
MR.	ARTHUR JR.	WHITE	63341	SCUBA DIVING	05	3L	LFA 5
ESTATE OF MR.	CLUNEY B.	BURTON	63471	SCUBA DIVING	05	3L	LFA 5
MR.	AUSTIN BOYD	FELTHAM	63358	SCUBA DIVING	05	3L	LFA 5
MR.	WILFRED	HUMPHRIES	63345	SCUBA DIVING	05	3L	LFA 5
MR.	BOYDE	ORAM	63343	SCUBA DIVING	05	3L	LFA 5
MR.	BRUCE DARROW	ORAM	63359	SCUBA DIVING	05	3L	LFA 5
MR.	DEREK	ORAM	63346	SCUBA DIVING	05	3L	LFA 5

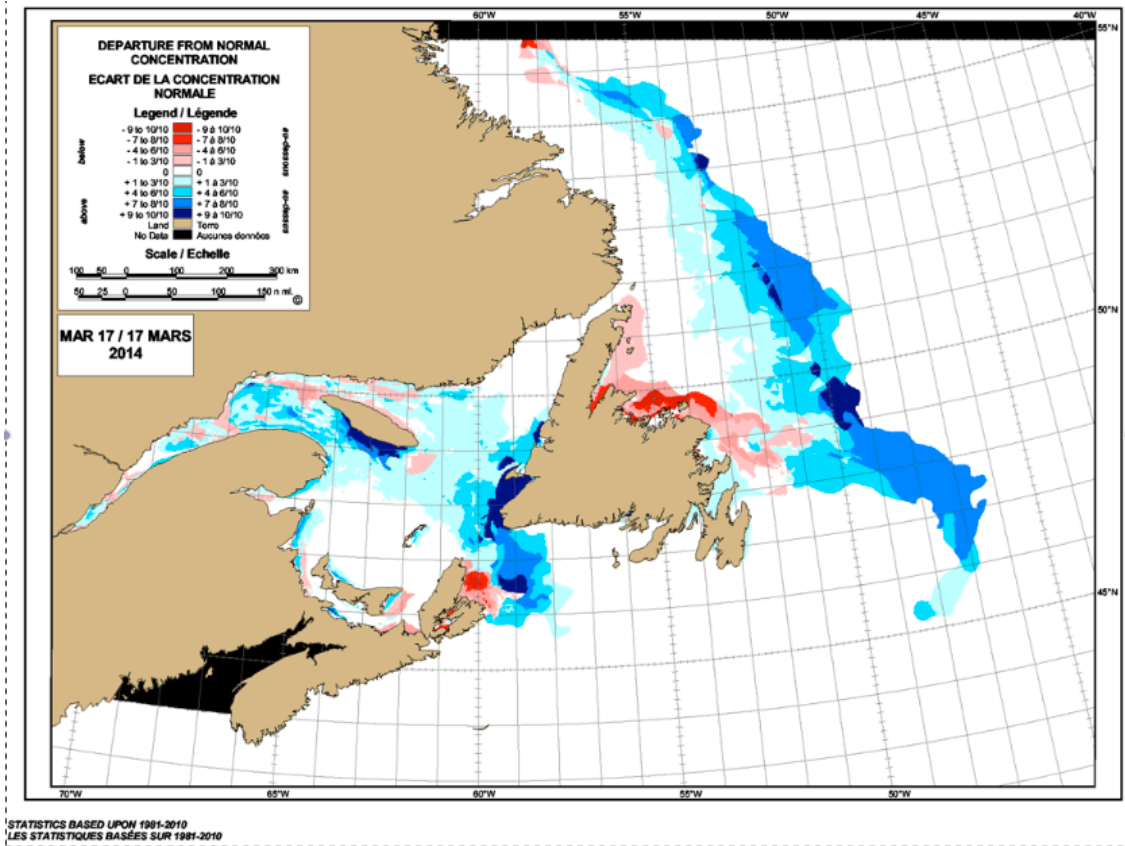
MR.	JAMIE G.	FORD	63344	SCUBA DIVING	05	3L	LFA 5
MR.	ALEXANDER	FELTHAM	63357	SCUBA DIVING	05	3L	LFA 5
MR.	DENNIS MICHAEL	CHAULK	63339	SCUBA DIVING	05	3L	LFA 5
MR.	RICK	HICKS	63354	SCUBA DIVING	06	3L	LFA 6
MR.	GLEN	MACKEY	63375	SCUBA DIVING	06	3L	LFA 6
MR.	RICHARD	JONES	63353	SCUBA DIVING	06	3L	LFA 6
MR.	LLOYD	PHILLIPS	63335	SCUBA DIVING	06	3L	LFA 6
MR.	EDWIN	RODGERS	63337	SCUBA DIVING	06	3L	LFA 6
MR.	GARY JOHN	SMITH	63336	SCUBA DIVING	06	3L	LFA 6
MR.	GARRY C	BRACE	63374	SCUBA DIVING	06	3L	LFA 6
MR.	JASON PETER	SMITH	63373	SCUBA DIVING	06	3L	LFA 6
MR.	JOHN	SMITH	63360	SCUBA DIVING	06	3L	LFA 6
MR.	ROBERT DEAN	SMITH	63361	SCUBA DIVING	06	3L	LFA 6
MR.	ALEXANDER DEAN	AKERMAN	63891	SCUBA DIVING	07	3L	LFA 7
MR.	MIKE	PHILPOTT	66683	SCUBA DIVING	07	3L	LFA 7
MR.	GREGORY	BRAKE	63502	SCUBA DIVING	08	3L	LFA 8
MR.	KENNETH	BRUCE	63504	SCUBA DIVING	10	3PS	LFA 10
MR.	MARTIN	HICKEY	63393	SCUBA DIVING	09	3L	LFA 9
MR.	JOSEPH JR.	MULROONEY	63394	SCUBA DIVING	09	3L	LFA 9
MR.	KEVIN	HARDY	69008	SCUBA DIVING	12	3PN	LFA 12
MR.	BERNARD	LEONARD	63767	SCUBA DIVING	10	3PS	LFA 10
MR.	BRIAN	WHYTE	63737	SCUBA DIVING	10	3PS	LFA 10
MR.	FRANCIS	WHYTE	63747	SCUBA DIVING	10	3PS	LFA 10
MR.	ROSS	DUNPHY	63362	SCUBA DIVING	10	3PS	LFA 10
MR.	WAYNE	DUNPHY	63363	SCUBA DIVING	10	3PS	LFA 10
MR.	RAYMOND H	NEIL	70968	SCUBA DIVING	11	3PS	LFA 11

Source : DFO

The following chart clearly indicates that ice coverage was higher in 2014 across the region than it has been for the past 20 years.



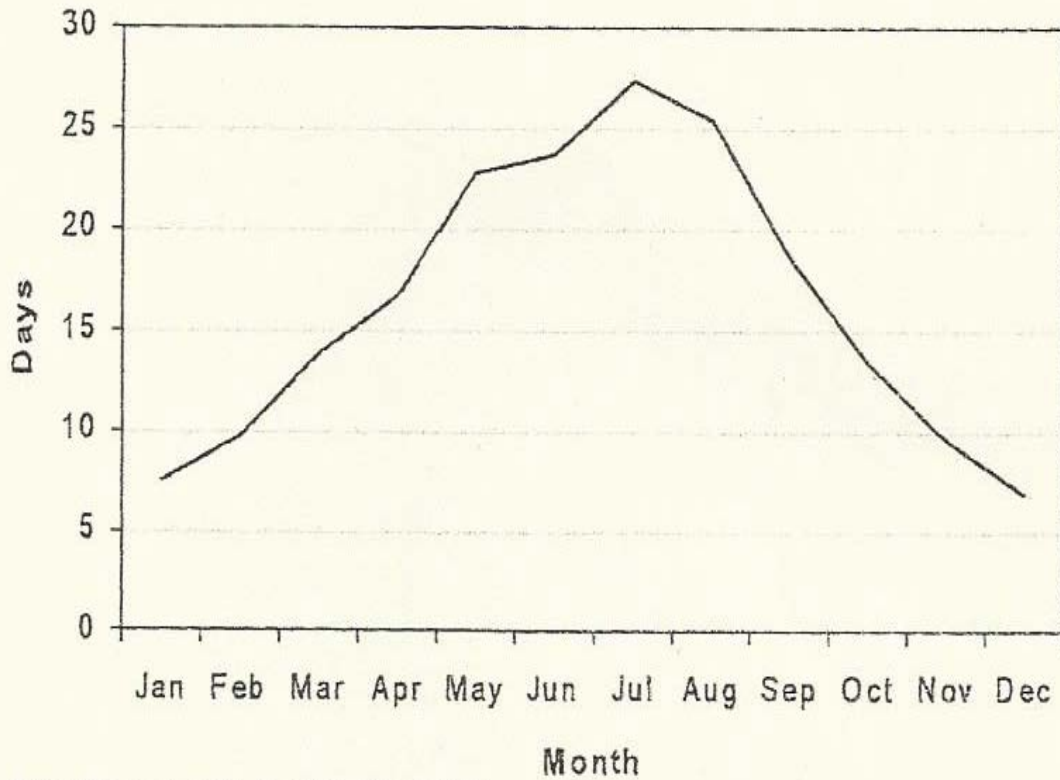
Ice coverage in bays occurred earlier and was heavier than normal in 2014.



The above map illustrates the differences of concentration between the ice concentration on the current regional ice chart and the Median of Ice Concentration for the period of 1981-2010 as shown in our [climatic ice atlases](#).

Areas in red indicate less ice than normal, and areas in blue indicate more ice than normal. Different shades of red and blue correspond to different categories of the departure from normal ice concentration as shown in the chart legend. Areas with normal concentrations are shown in white. This allows for a quick comparison between current conditions and normal conditions.

Number of Days with Wind Speed
Less than 20 Knots



Source: Environment Canada; Inshore Shrimp Panel

Source: Review of the Cooked and Peeled Shrimp Industry, Report of the Inshore Shrimp Panel

26.02 Sea Urchin Minimum Size and Tolerance

1. Prohibition

It is unlawful for any person to take, possess, ship, transfer, transport, buy, or sell a sea urchin having a shell measuring less than 21/16 inches in the longest diameter, measuring from the top or bottom of the urchin, exclusive of spines.

2. Exceptions to 26.02(1) Prohibition

A. Possession Tolerance for All Persons

Any person may possess sea urchins measuring less than 21/16 inches if they comprise less than 5% of any bulk pile.

B. Take Tolerance for Harvesters

(1) Zone 1 & 2 Divers

Zone 1 & 2 divers may take sea urchins that are less than 21/16 inches if they comprise less than 20% of any bulk pile prior to culling on board.

(2) Take Tolerance for All Other Harvesters

All licensed sea urchin harvesters except Zone 1 & 2 divers may take sea urchins that are less than 21/16 inches prior to culling on board.

C. Sea Urchins Obtained Outside the State of Maine

Any person exceeding the possession tolerance of this regulation for sea urchins measuring less than 21/16 inches shall not be in violation of Chapter 26.02 if that person is in possession of a bill of lading for the amount of the sea urchins exceeding the tolerance amount showing those sea urchins were lawfully obtained from an origin outside the State of Maine. The absence of a bill of lading shall be prima facie evidence that the sea urchins were taken from waters within the jurisdiction of the State of Maine.

3. Tolerance

Tolerance shall be determined by numerical count of not less than ½ bushel taken at random from various parts of the bulk pile or by count of the entire bulk pile if it contains less than ½ bushel.

If any person is found in possession of sea urchins measuring less than 21/16 inches that comprise more than 5% of the bulk pile pursuant to 26.02(2)(A) or 20% pursuant to 26.02(2)(B)(1), that bulk pile shall be considered contraband and subject to seizure.

Source: Department of Marine Resources, Chapter 26 -Sea Urchin

Grading Framework

There was unanimous support from all industry participants to implement some method of grading the catch in order to provide information regarding success of harvesting methods, and add transparency to pricing. Most parties felt the program is best delivered by grading at the plant in order to reduce costs and where a suitable grading environment exists. The attributes of such a program may include:

- Right of refusal by producer to purchase urchins based on driver inspection at the point of collection. The criteria used to determine refusal and field-sampling plan should be developed and documented for use by buyers and verification by harvesters.
- A sampling plan would be developed whereas samples would be drawn from a number of pans in each harvester's shipment. The pans selected for sampling would be weighed, then dumped in order to select samples randomly throughout the pan. Whereas is estimated there are 400-500 urchins per pan a statistician should develop a 90% confidence interval sampling plan based on the number of pans sold.
- Water deduction will be determined through completion of a number of randomly selected pans from several areas and harvesters. A protocol for this will be developed in order to ensure accuracy of results, 90% confidence interval. The draining time from time of receipt at plant will be predetermined by all parties. Once completed this water deduction will be applied to all shipments for the duration of the season.
- Each pan sampled would have all foreign materials (rocks, kelp, etc.) and undersized urchins removed and weighed. The gross weight of incoming urchins would be determined by weighing back the pan, foreign materials and undersized urchins then reducing the amount by the water deduction to determine the net weight of 'commercial size' urchins per pan.
- The prescribed number of urchins would be selected at random for subsequent yield and quality tests. These samples from each pan would be placed in a tray and the non-sampled urchins returned to the pan. The prescribed number of pans would be selected, weighed and all samples would be selected.
- The net weight, less tray weight and water allowance, would be determined for all urchins selected for sampling.
- Urchins would be cracked and roe removed and separated into at least two colour grades for each male and female. These colour grades should be determined with a working group comprised of producers and harvesters and colours documented through a series of photos to be used by the grader.

- The roe would be washed to remove any gut content and washed roe in trays placed in salt water until all roe samples have been removed and washed.
- Each tray of roe would be removed from saltwater and drained for a prescribed period of time. Each colour grade would then be weighed, percent of each grade determined, and the total yield documented.
- The harvester would be notified of the grade result by email or phone and provided with a 12-24 hour period to review the findings at the plant prior to the batch being processed.
- All roe samples would be given to the buyer for packing and subsequent sales.