



## STOCK STATUS UPDATE OF STRIPED SHRIMP (*PANDALUS MONTAGUI*) IN SFA 4

### Context

The last full assessment of Striped Shrimp (*Pandalus montagui*) in Shrimp Fishing Area (SFA) 4 took place in February, 2017 (Fisheries and Oceans Canada [DFO] 2017a). Resource Management requested the current stock status to inform the development of management measures for the 2018/19 fishing season. Science advice for the Eastern and Western Assessment Zones (SFAs 2-3) is provided and published through the Central and Arctic Region of DFO, while science advice for SFAs 4-6 Northern Shrimp (*Pandalus borealis*) will be provided through a full assessment process by the Newfoundland and Labrador Region of DFO in February, 2018.

This Science Response Report results from the Science Response Process (SRP) of February 2, 2018 for the Northern and Striped Shrimp Update for the Eastern and Western Assessment Zones, and Striped Shrimp Update for Shrimp Fishing Area (SFA) 4.

### Background

Stock status indicators for Striped Shrimp in SFA 4 were evaluated based on commercial catch and the fishable biomass index from a Northern Shrimp Research Foundation (NSRF) summer shrimp survey in Northwest Atlantic Fisheries Organization (NAFO) Division 2G. Exploitation rate index, calculated using catch and the fishable biomass index, was also utilized.

### Analysis and Response

#### Fishery

Commercial catch of Striped Shrimp, taken as by-catch in the SFA 4 Northern Shrimp fishery, increased from 280 t in 2008 to 4,700 t in 2012 and declined to 2,500 t in 2017/18 (preliminary catch as of the January 11, 2018 Canadian Atlantic Quota Report (CAQR)). Although 2017/18 catch reached the highest commercial catch since 2012, the by-catch limit of 4,033 t has not been taken since it was implemented in 2013/14 (Figure 1, Table 1). Until 2012, the sole source of catch information for Striped Shrimp was logbooks; however by-catch was recorded in the CAQR beginning in 2013.

#### Biomass

Some of the fluctuation of biomass indices likely results from transfer across management boundaries, particularly from the Western Assessment Zone to the northwest corner of SFA 4 (DFO 2017b), rather than local dynamics within a population. Between 2005 and 2017 the fishable biomass index ranged between 13,300 t and 46,500 t. In 2017 it was 45,500 t, a 90% increase from 2016 (Figure 2, Table 2).

The female spawning stock biomass (SSB) that is relevant to a Precautionary Approach (PA) for an area consists of the animals whose spawning products will ultimately be caught in that area (as opposed to the animals that spawn in that area). The strong currents that likely affect all sizes of shrimp, particularly larvae, create especially severe problems for estimating female SSB in SFA 4. The true female SSB is more than the females observed by the survey within SFA 4. Therefore, female SSB for Striped Shrimp is unknown in SFA 4.

### **Exploitation**

The preliminary exploitation rate, based upon the January 11, 2018 CAQR catch of 2,500 t, is 5.5% (Figure 3, Table 2).

### **Current Outlook**

There is no Integrated Fisheries Management Plan (IFMP) PA framework for this resource. If the by-catch limit is taken, the exploitation rate index will be 8.9% in 2017/18.

## **Conclusions**

Current status of this resource is unknown due to the large fluctuations in biomass from year to year, which are likely influenced by currents and tides in SFA 4. The potential exploitation rate of 8.9% is assumed to maintain a healthy SFA 4 Striped Shrimp resource. However, without a reliable female SSB index, the status of the Striped Shrimp resource relative to a PA framework could not be determined.

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February 15, 2018

### Sources of information

- DFO. 2017a. [An assessment of Northern Shrimp \(\*Pandalus borealis\*\) in Shrimp Fishing Areas 4-6 and of Striped Shrimp \(\*Pandalus montagui\*\) in Shrimp Fishing Area 4 in 2016](#). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/012.
- DFO. 2017b. [Assessment of Northern Shrimp, \*Pandalus borealis\*, and Striped Shrimp, \*Pandalus montagui\*, in the Eastern and Western Assessment Zones, February 2017](#). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/010. (Erratum: April 2017)

**Appendix I: Tables**

Table 1. Catches (as of the January 11, 2018 CAQR) and by-catch limits for SFA 4 *Pandalus montagu*.

Year	By-Catch Limit (t)	Catch (t)
2002	-	25
2003	-	0
2004	-	83
2005	-	813
2006	-	1,805
2007	-	2,182
2008	-	278
2009	-	617
2010	-	1,115
2011	-	3,236
2012	-	4,708
2013/14	4,033	1,611
2014/15	4,033	1,236
2015/16	4,033	2,135
2016/17	4,033	1,113
2017/18	4,033	2,486

Table 2. Fishable biomass and exploitation rate indices for *Pandalus montagu* in SFA 4.

Survey Year	Fishable Biomass Index Lower 95% CI (x1,000 t)	Fishable Biomass Index (x1,000 t)	Fishable Biomass Index Upper 95% CI (x1,000 t)	Change in Fishable Biomass Index From Last Year (%)	Exploitation Rate Lower 95% CI (%)	Exploitation Rate Index (%)	Exploitation Rate Upper 95% CI (%)
2005	10.4	18.6	31.3	-	2.60	4.37	7.81
2006	8.56	14.1	23.3	-24.2	7.75	12.8	21.0
2007	9.41	17.5	27.8	24.1	7.85	12.4	23.1
2008	21.5	37.3	56.8	113	0.49	0.75	1.29
2009	11.5	20.9	34.3	-44.0	1.80	2.95	5.36
2010	8.37	14.5	23.0	-30.6	4.85	7.69	13.3
2011	8.57	13.3	21.0	-8.28	15.4	24.3	37.7
2012	11.1	25.6	38.6	92.5	12.2	18.3	42.4
2013	26.3	37.8	53.7	47.7	3.00	4.26	6.13
2014	22.5	31.0	45.8	-18.0	2.70	3.99	5.49
2015	27.5	46.5	70.1	50.0	3.05	4.59	7.76
2016	16.3	23.9	36.7	-48.6	3.03	4.66	6.83
2017	27.7	45.5	70.5	90.4	3.53	5.46	8.97

Appendix II: Figures

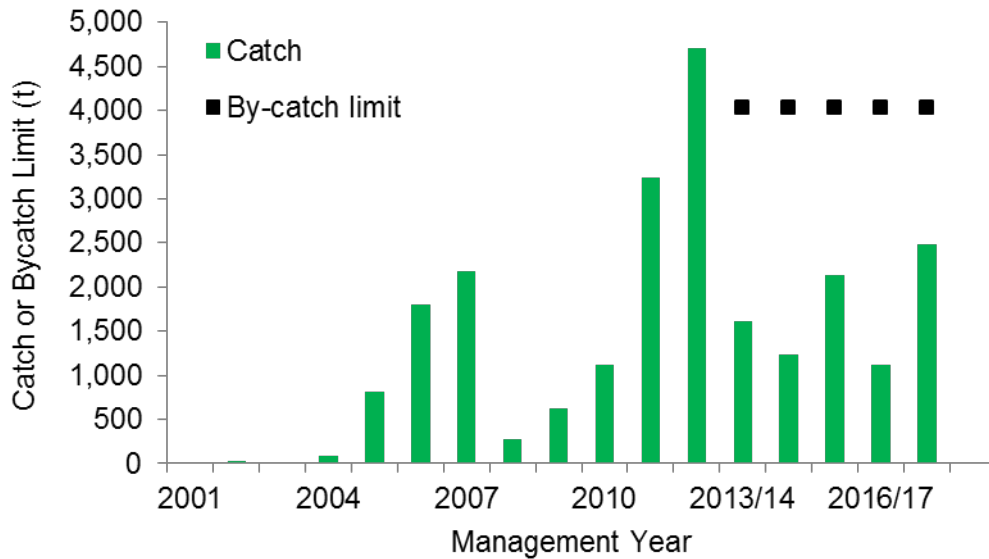


Figure 1. SFA 4 historical *Pandalus montagui* catches and by-catch quotas for the period 2001 – 2017/18 (2017/18 catches are preliminary as of January 11, 2018).

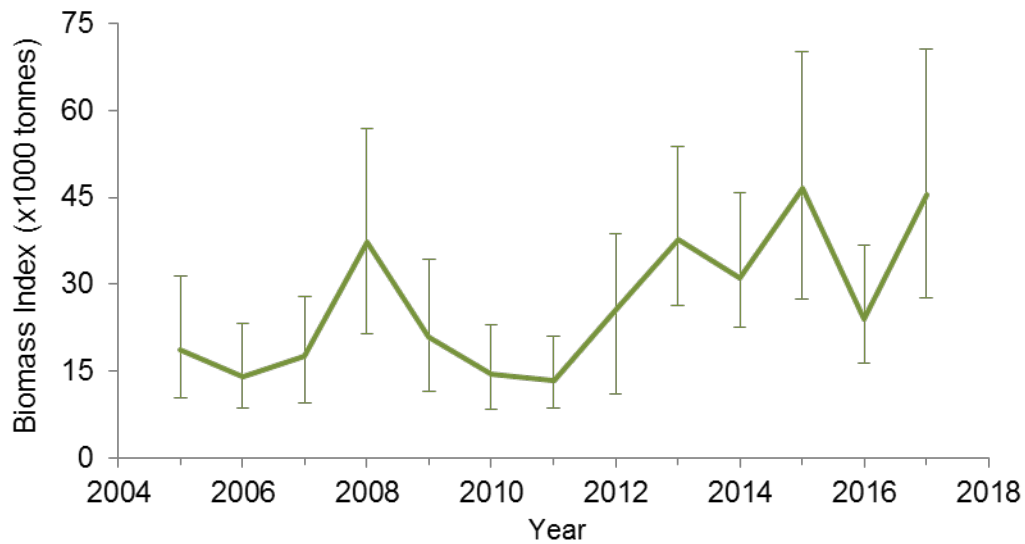


Figure 2. SFA 4 fishable biomass index for *Pandalus montagui*. Error bars indicate 95% confidence intervals.

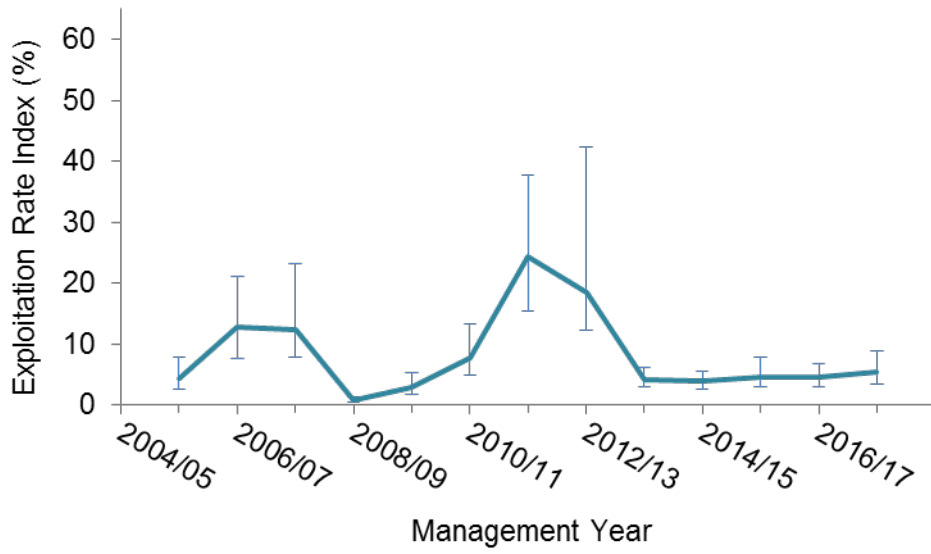


Figure 3. SFA 4 *Pandalus montagui* exploitation rate index based on total catch/fishable biomass index from the same year, expressed as a percentage. Error bars indicate 95% confidence intervals. The 2017/18 value is preliminary.

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