Northwest Atlantic Fisheries Organization

**Serial No. N6120** **NAFO SCR Doc.12/058**

**NAFO-ICES PANDALUS ASSESSMENT GROUP MEETING– OCTOBER 2012**

# Estonian Shrimp Fishery in Div. 3L in 2010-2012

by

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## Abstract

Data has been collected by Estonian observers on board Estonian commercial shrimp trawlers. Catch, effort and discard data is recorded on haul-by-haul basis. Unstandardized average CPUE has decreased from 1163 kg/h to 680 kg/h from 2010 to 2012. Number of vessels has decreased from 10 in 2000 to one in 2012. Vessels are deployed in shrimp fishery only in January, February and August to December in recent years. One shrimp sample for length frequencies is taken every day. To avoid data loss from daily vertical migration of shrimp the length sampling is done from haul taken during daytime.

## Introduction

Estonia commenced shrimp fishery in NAFO Regulation Area in 1994. In two first years (1994 and 1995) the shrimp catch of Estonian vessels was 1081 and 2092 tons accordingly. CPUE of shrimp for Estonian and Latvian vessels was approximately 140 kg per hour, which was significantly lower compared to catch rates of other countries (Parsons *et al.*, 1998). Estonia had 4 shrimp vessels fishing for shrimp in NRA in 1994, 10 vessels in 2000 and 3 vessels in 2009. The number of shrimp vessels operating in 3L has decreased to one vessel in 2012 (Table 1).

## Material and methods

### Data

Data used in this overview is collected by Estonian observers on board Estonian commercial shrimp vessels. Catch, effort and discard data is recorded on haul-by-haul basis. Vessels have been deployed in shrimp fishery mainly only in January, February and August to December in 2010-2012.

### Catch and discard

Catch includes kept and discarded shrimp. Kept catch is calculated back from final product using appropriate conversion factors to derive live weight of shrimp. Overpacking factor is also added. Overpacking and conversion factor are calculated for each product type (cooked, frozen etc.) and for package size (19 kg bags, 5 kg boxes etc.). Boiling of shrimp reduces the weight. Boiled shrimp weight has been corrected by factor 1.13 in Skagerrak fisheries

(NIPAG, 2012). Discard weight is estimated by observers by eye and by previous knowledge by observing the production process in the factory on board.

**Biological sampling**

One shrimp sample for length frequencies and maturity is taken every day. To avoid data loss from daily vertical migration of shrimp (Shumway *et al.*, 1985) the length sampling is done from haul taken during daytime. Each sample is a random sample from bunker and is around 1 kg. Shrimp is measured and combined to 0.5 mm pins by carapace length and maturity determined according to Rasmussen (1953) on board. Maturity is defined by five stages - males; transitionals; primiparous females; ovigerous females, and multiparous females. Shrimp numbers are boosted to total catch using accumulated sample weight.

## Results

**Catch, effort and discard**

Decreased total catch has led to situation that vessels are deployed in fishery only in January, February and August to December depending on the available quotas. Effort has been fluctuating between 1500 to 2700 hours in 2006-2010 and is about mean of the time series in 2011. Effort in 2012 is estimated to be less than average of time series. Number of vessels has decreased from 10 in 2000 to one in 2012 (Table 1).

Average discard of shrimp (by weight of total shrimp catch) in Estonian shrimp fishery in 2009 was 0.4%, in 2010 0.35% (Sirp, 2011) and in 2011 0.81% (Sirp, 2012). This consists mainly of shrimp that is fallen down during the processing of catch in the factory. Average combined overpacking and conversion factor for different products was 1.05. This factor is added to the product weight to calculate a live weight of shrimp.

Unstandardized average CPUE has decreased from 1163 kg/h to 680 kg/h from 2010 to 2012 (Table 1, 2; Fig. 1).

**Biological sampling**

Length frequency consists of wide range of carapace lengths that suggests that several age-groups are targeted (Table 3; Fig. 2).

## References

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Table 1. Average CPUE, effort, catch and number of vessels in Estonian shrimp fishery in 2010-2012.

| | 2010 | 2011 | 30 Sept 2012 |
|---|---|---|---|
| Average CPUE kg/h | 1163 | 738 | 680 |
| Effort hrs | 1882 | 2011 | 514 |
| Catch t | 2002 | 1336 | 321 |
| Number of vessels | 2 | 2 | 1 |

Table 2. Shrimp CPUE (kg/h) of Estonian vessels in 3L in 2010-2012 by month and vessel.

| **CPUE** | | Vessel | |
|---|---|---|---|
| **Year** | **Month** | **B** | **D** |
| **2010** | 8 | | 1572 |
| **2010** | 9 | | 1348 |
| **2010** | 10 | | 1048 |
| **2010** | 11 | | 954 |
| **2010** | 12 | | 999 |
| **2011** | 1 | | 947 |
| **2011** | 2 | | 930 |
| **2011** | 10 | 531 | |
| **2011** | 11 | 562 | |
| **2011** | 12 | 513 | |
| **2012** | 1 | 533 | |
| **2012** | 9 | 783 | |

Table 3. Shrimp length frequency boosted to total catch. Estonian shrimp fishery in 3L in 2010-2012.

| AREA | 3L | | | | | |
|---|---|---|---|---|---|---|
| Year | 2010 | | 2011 | | 30 Sept 2012 | |
| Total sample weight kg | 83.4664 | | 85.308 | | 18.662 | |
| Number of samples | 78 | | 73 | | 18 | |
| Shrimp number boosted to total catch | | | | | | |
| CL mm / Sex | Male | Female | Male | Female | Male | Female |
| 10.5 | 0 | 0 | 62651 | 0 | 0 | 0 |
| 11 | 0 | 0 | 125303 | 0 | 17204 | 0 |
| 11.5 | 0 | 0 | 78314 | 0 | 0 | 0 |
| 12 | 0 | 0 | 109640 | 0 | 0 | 0 |
| 12.5 | 71949 | 0 | 46988 | 0 | 0 | 0 |
| 13 | 359743 | 0 | 266268 | 0 | 86020 | 0 |
| 13.5 | 311777 | 0 | 281931 | 0 | 137632 | 0 |
| 14 | 407708 | 0 | 360245 | 0 | 258061 | 0 |
| 14.5 | 479657 | 0 | 360245 | 15663 | 240857 | 0 |
| 15 | 719485 | 0 | 563862 | 15663 | 223653 | 0 |
| 15.5 | 647537 | 0 | 845792 | 15663 | 258061 | 0 |
| 16 | 1247108 | 0 | 1018083 | 15663 | 103224 | 0 |
| 16.5 | 1894645 | 0 | 1409654 | 15663 | 172041 | 0 |
| 17 | 2278371 | 23983 | 3179553 | 31326 | 292469 | 0 |
| 17.5 | 3429547 | 47966 | 4260288 | 46988 | 326877 | 0 |
| 18 | 4149033 | 23983 | 5074754 | 46988 | 498917 | 0 |
| 18.5 | 5204278 | 215846 | 5403674 | 109640 | 1049447 | 0 |
| 19 | 6115626 | 527623 | 6688025 | 219280 | 929019 | 0 |
| 19.5 | 7290786 | 647537 | 8082016 | 234942 | 1135467 | 51612 |
| 20 | 8801705 | 983297 | 9115762 | 469885 | 1083855 | 137632 |
| 20.5 | 8513911 | 1990576 | 8222981 | 1127723 | 1187080 | 206449 |
| 21 | 8417980 | 2734045 | 9037448 | 3226541 | 1204284 | 344081 |
| 21.5 | 7146889 | 3045822 | 8003702 | 5575965 | 1789221 | 430101 |
| 22 | 6067661 | 4173016 | 6406094 | 8097679 | 2288139 | 550530 |
| 22.5 | 4436827 | 5180295 | 5184394 | 6265129 | 2012874 | 1066651 |
| 23 | 1702782 | 9737036 | 4244625 | 6938630 | 1651589 | 1634385 |
| 23.5 | 311777 | 11152024 | 3680763 | 5388011 | 1462344 | 2167710 |
| 24 | 167880 | 12447098 | 2819308 | 5528976 | 1032243 | 2580608 |
| 24.5 | 47966 | 13118618 | 2318098 | 5231382 | 911815 | 2855872 |
| 25 | 0 | 15349023 | 1300014 | 7455503 | 688162 | 2735444 |
| 25.5 | 0 | 15444954 | 485547 | 6750676 | 412897 | 2597812 |
| 26 | 0 | 16764011 | 156628 | 7659120 | 103224 | 2167710 |
| 26.5 | 0 | 15612834 | 0 | 6296454 | 0 | 1393528 |
| 27 | 0 | 15708766 | 0 | 6500071 | 0 | 1049447 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 27.5 | 0 | 14005983 | 0 | 4996440 | 0 | 722570 |
| | 28 | 0 | 12926755 | 0 | 4667521 | 0 | 705366 |
| | 28.5 | 0 | 11487784 | 0 | 3680763 | 0 | 481713 |
| | 29 | 0 | 11008127 | 0 | 2521714 | 0 | 240857 |
| | 29.5 | 0 | 7194854 | 0 | 1942190 | 0 | 275265 |
| | 30 | 0 | 7146889 | 0 | 1440980 | 0 | 154836 |
| | 30.5 | 0 | 4460810 | 0 | 971095 | 0 | 103224 |
| | 31 | 0 | 3429547 | 0 | 767478 | 0 | 86020 |
| | 31.5 | 0 | 2518199 | 0 | 422896 | 0 | 0 |
| | 32 | 0 | 1654817 | 0 | 140965 | 0 | 17204 |
| | 32.5 | 0 | 935331 | 0 | 109640 | 0 | 17204 |
| | 33 | 0 | 767451 | 0 | 109640 | 0 | 17204 |
| | 33.5 | 0 | 359743 | 0 | 31326 | 0 | 0 |
| | 34 | 0 | 143897 | 0 | 46988 | 0 | 0 |
| | 34.5 | 0 | 71949 | 0 | 31326 | 0 | 0 |
| | 35 | 0 | 23983 | 0 | 15663 | 0 | 0 |
| | 35.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 80222627 | 223064471 | 99192650 | 105175848 | 21556676 | 24791038 |

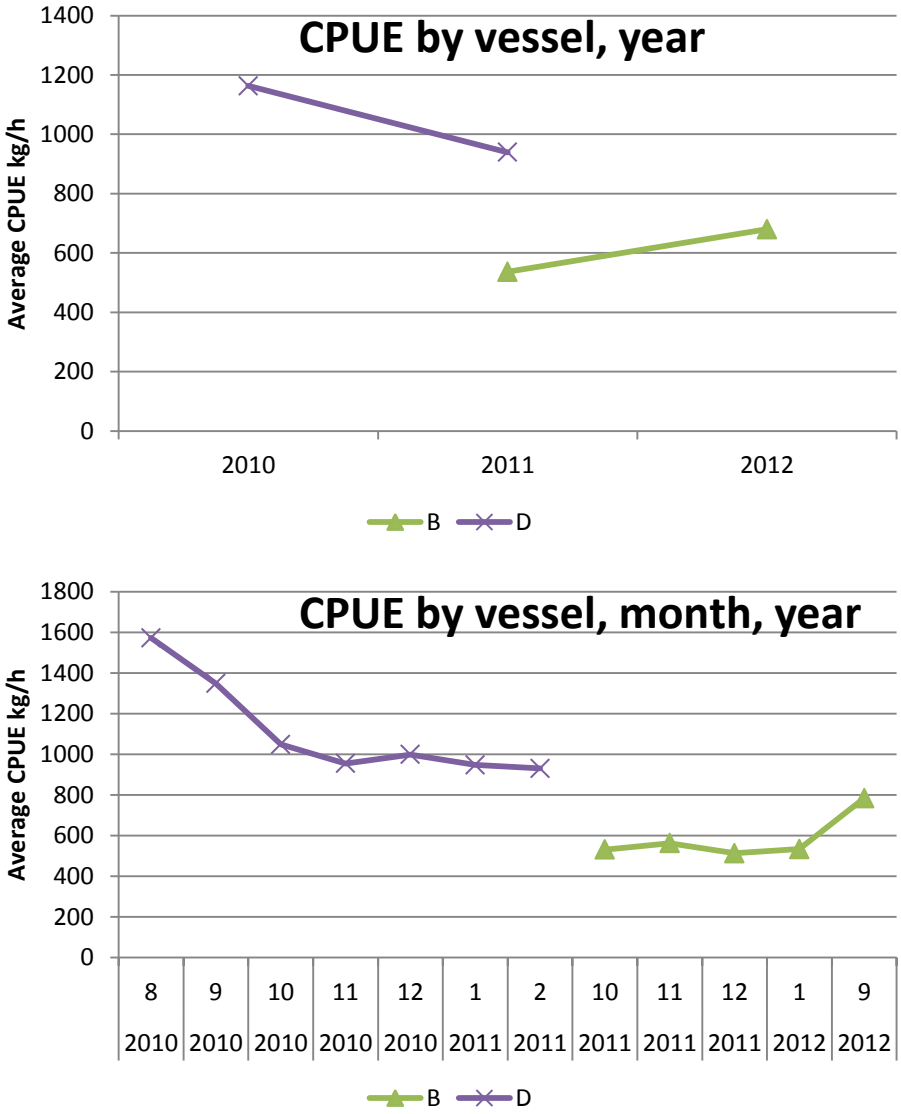


Fig 1. Shrimp unstandardized average CPUE of Estonian vessels in 3L in 2010-2012.

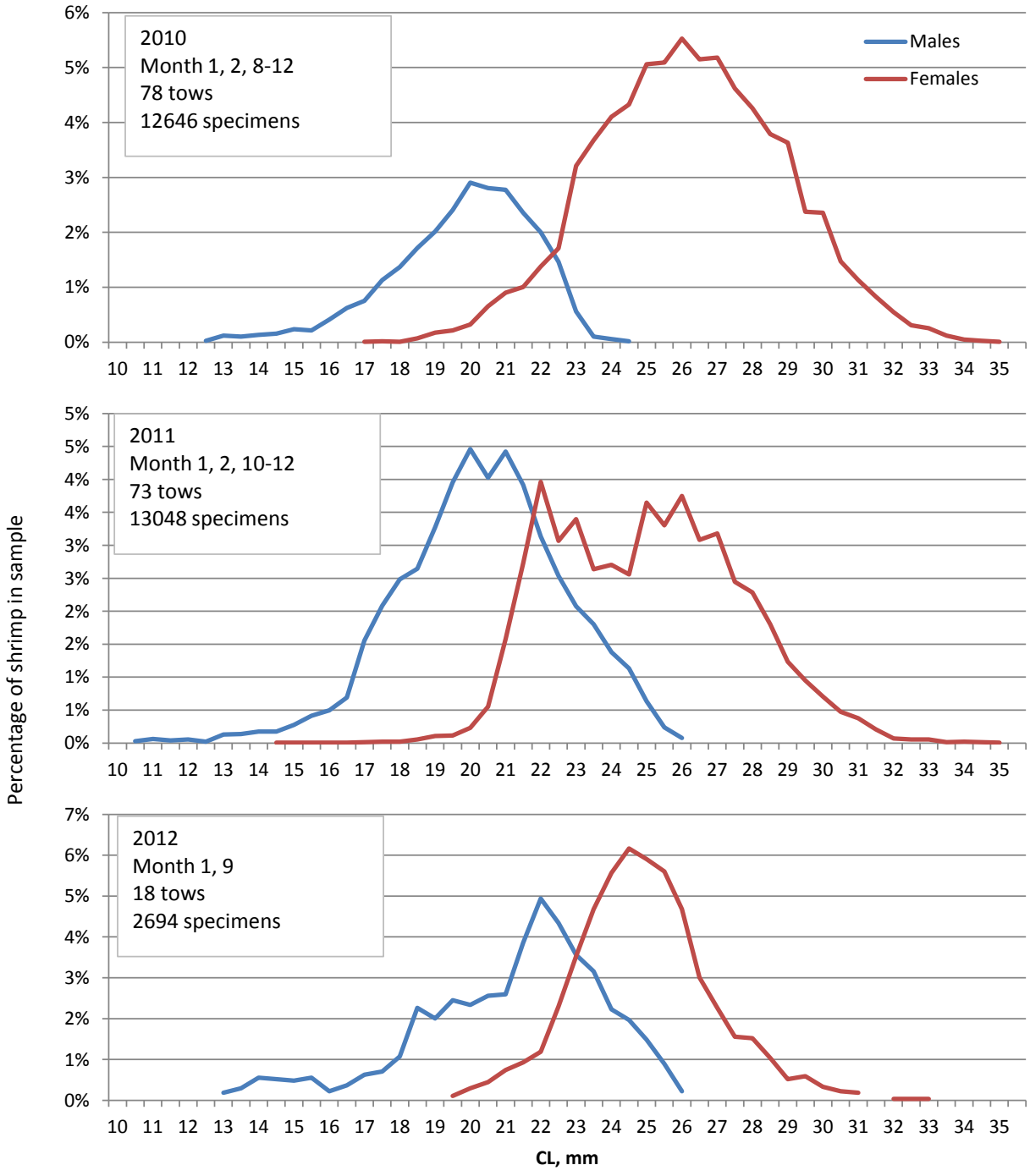


Fig 2. Shrimp length frequencies from Estonian commercial trawlers in 3L in 2010-2012. Sampled month, number of tows and specimens.