ESTONIAN FISHERY 2012

FISHERIES INFORMATION CENTRE

Prepared by:
Toomas Armulik & Silver Sirp

Authors:
Redik Eschbaum, Jarko Jaadla, Heiki Jaanuska, Ain Järvalt, Janek Lees, Tiit Paaver, Katrin Pärn, Tiit Raid, Toomas Saat, Silver Sirp, Heli Špilev & Väino Vaino

Edited by:
Toomas Armulik & Silver Sirp

Translated by: Päevakera OÜ
Layout: Eesti Loodusfoto OÜ
Cover photo by: Reyktal AS

Issued by:
Fisheries Information Centre 2013
www.kalateave.ee

ISSN 2228-1495

EUROOPA KALANDUSFOND
JÄTKUSUUTLIKU KALANDUSE HEAKS

Toetab Euroopa Liit

Estonian Fishery 2012

Fisheries Information Centre
Pärnu 2013

Table of contents

Foreword 6
Abbreviations 8

Distant-water fishery 9

9 Fleet
10 State of fish stocks and fishing opportunities
13 Catches and revenue
15 Outlook

Baltic Sea fisheries 16

16 COASTAL FISHERY IN THE BALTIC SEA
20 Dynamics of coastal fishing catches in different parts of the Baltic Sea
- Gulf of Finland 20
- High seas 21
- Väinameri Sea 21
- Gulf of Riga 22
- Pärnu Bay 23

34 TRAWL FISHERY IN THE BALTIC SEA
34 Stocks and catches of herring, sprat and cod, and future outlooks
- Herring 34
- Central Baltic herring 35
- Gulf of Riga herring 38
- Comparison of trawl and coastal fishery herring catches 41
- Sprat 43
- Cod in subdivisions 25–32 (Eastern Baltic) 47

49 ESTONIA'S TRAWL FLEET IN THE BALTIC SEA
49 General overview of sector
52 Basic and economic indicators of 12–18 m length class trawlers
53 Basic and economic indicators of 24–40 m length class trawlers

Inland fisheries 54

54 Lake Võrtsjärv Fishery
57 Lake Peipsi Fisheries
- State of fish stocks 57
- Catches 60
- Catch value 63
- Dangers and problems 63

Recreational fishing 65

65 Proportion and gender, age and socio-demographic distribution of recreational fishermen
66 Recreational fishermen's participation in fishing process and intensity of fishing
66 Use of fishing gear
66 Intensity of using fishing grounds
66 Catches of recreational fishermen
67 Expenses incurred in recreational fishing

Aquaculture 68

68 Overview of sector
69 Estonian Aquaculture Development Strategy 2014–2020
69 Representative organisations of the sector
70 Production and sales
70 Fish restocking
71 Put-and-take fishing (fishing tourism)
71 Problems related to the use of the environment
72 Research and development

Estonian fish processing industry 73

73 General overview of sector
74 Basic and economic indicators and trends of companies whose main business is fish processing
75 Production and sales
76 Aid granted to fish processing industry

Grants 78

Ichthyologic and fishery-related research projects 82

References 87

Foreword

Dear reader,

Once again, the Fisheries Information Centre has a great pleasure to issue a yearbook that describes the state of Estonian fishery and to conclude that fishery continues to be a viable branch of the economy despite all the difficulties, whether natural or economic.

Given that the shrimp quotas of our distant-water fishers for the Atlantic Ocean decreased in 2012, it is a delight to still find the name of a distant-water fishery company on the list of the most successful companies of Estonia. Like in previous years, the sprat and herring quotas of Estonian fishers for the Baltic Sea were also reduced in view of the state of the stocks, but the quota reduction was fortunately offset by increased first sales prices of the fish.

It is coastal fishermen that embody fishery for many Estonians, and the state of the fisheries sector is evaluated with reference to coastal fisheries. The number of coastal fishermen has been relatively stable in the past three years and we are happy to observe the ranks of fishermen being complemented with younger and progressive people. Nevertheless, concerns remain about the ageing of Estonian fishermen and about the growing need to add value to catches and find other activities besides classical fishing to stay competitive. Just as in 2010 and 2011, coastal fishery revenues were mainly generated by three species – perch, herring and pikeperch – in 2012. Unlike the previous two years, however, our national fish species was also the most profitable species for coastal fishermen in 2012.

Recreational fishing is an area that can boast increasing numbers. This healthy activity is the favourite hobby of an increasing number of people living in Estonia. Therefore, people's expenditure on recreational fishing, as well as state revenues from fishing fees, are growing.

It would be nice to report a major leap in development in the Estonian aquaculture sector and conclude that many of the fish farms established with support from the European Fisheries Fund started full-scale production activities in 2012. Unfortunately, this was not the case. The quantities of fish produced on our farms remained at previous levels, but we hope to see a noticeable improvement in this field soon.

The Estonian fish processing industry proved its viability: both the number of fish processing companies and their sales revenues grew. Most of the companies closed 2012 with a profit, but investments in fixed assets decreased compared to the preceding year. The strength of the fish processing industry is evidenced by the fact that Finnish trawling companies are being bought in response to the reduction of quotas resulting in a shortage of raw material – thus a significant part of our northern neighbours' fish is ultimately processed by Estonian companies.

Let us not forget that the face of Estonian fishery is not shaped just by the people who catch, process or sell fish on a daily basis. The sector is managed by two ministries, supervised by a number of monitoring and support agencies, and assisted with knowledge and research by universities and research institutions. In fact, each person living in Estonia can have a great influence on the well-being of our fishery by appreciating the local fish – both as a part of nature and as food.

I believe that 2012 was a fairly busy and challenging year for the Estonian fishery sector. This publication provides an overview of the year.

Toomas Armulik,
Head of Fisheries Information Centre

Abbreviations

B_{lim}	the limit biomass, reaching which should be prevented by fisheries management, as below this level the risk of stock collapse increases significantly
CPUE	catch per unit effort
EFF	European Fisheries Fund
EIER	Estonian Institute of Economic Research
EU	European Union
EULS	Estonian University of Life Sciences
EULS IAE	Institute of Agricultural and Environmental Sciences at the Estonian University of Life Sciences
EULS IVA	Institute of Veterinary Medicine and Animal Sciences at the Estonian University of Life Sciences
F	fishing mortality rate
F_{med}	the fishing mortality rate which secures a balanced ratio of spawning stock and recruitment
F_{MGT}	international management plan-based fishing mortality rate target level
F_{MSY}	maximum fishing mortality for sustainable yield
F_{PA}	sustainable mortality rate i.e. maximum sustainable exploitation intensity (fishing mortality precautionary approach)
F_{sq}	fishing mortality status quo
GT	gross tonnage
ICES	International Council for the Exploration of the Sea
EIC	Environmental Investment Centre
MoE	Ministry of the Environment
M	natural mortality
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission
NIPAG	Joint NAFO/ICES Pandalus Assessment Working Group
MoA	Ministry of Agriculture
ARIB	Agricultural Registers and Information Board
RFMO	Regional Fisheries Management Organisation
SE	Statistics Estonia
SL	standard length; the length of a fish measured from the tip of the snout to the end of scale cover
SSB	spawning stock biomass
STECF	European Commission's Scientific, Technical and Economic Committee for Fisheries
TAC	total allowable catch
TL	total length; the length of a fish measured from the tip of the snout to the end of the caudal fin
TW	total weight of a fish
UT EMI	Estonian Marine Institute of University of Tartu
Z	total mortality

Distant-water fishery

Distant-water fishery means fishing outside of the Baltic Sea. Distant-water fishing vessels flying the Estonian flag have fishing rights on three fishing grounds: Svalbard, North West Atlantic (NAFO) and North East Atlantic (NEAFC). After acceding to the European Union, Estonia retained fishing rights as a member of these international organisations on the basis of the principle of relative stability and as a share of the fishing quota of the European Union (Aps *et al.*, 2005).

Fleet

The distant-water fishing fleet still consists solely of trawlers on board which fish or shrimp undergo primary or final processing. In general, demersal trawls are used. However, pelagic trawls are occasionally used as well. A crew typically consists of around 20 people.

According to the data of the Estonian Fishing Vessel Register (as at 31 December 2012), there were six vessels in the distant-water fishing sector. Four vessels caught shrimp as the main target species and less frequently also fish, and two vessels only caught fish as the main target species. During the year, one new fishing vessel (Reval Viking) was registered and one fishing vessel (Lomur 2) was deleted from the register. The average length of the vessels was 62 metres; the average age was 28 years; the combined power of the vessels' main engines was 15,982 kW; and the combined gross tonnage (GT) was 9,100 tonnes (Table 1). The average age of the vessels decreased because the newly registered vessel was constructed in 2000. All the active registered vessels were actually engaged in fishing. In contrast, in previous years there were some vessels that had been registered as active vessels, but which in reality were not used for fishing. Vessels are owned by three companies (two companies in 2011).

Table 1. Main characteristics of Estonian distant-water fishing fleet, 2005–2012

Year	Number of vessels	Combined power of main engines (kW)	Combined gross tonnage (GT)
2005	10	18 605	11 520
2006	11	21 413	12 923
2007	10	19 923	12 215
2008	8	15 634	10 331
2009	6	12 670	8 281
2010	6	12 670	8 281
2011	6	12 670	8 281
2012	6	15 982	9 100

Source: MoA

State of fish stocks and fishing opportunities

The state of fish stocks in the NAFO area is assessed by the Scientific Council of NAFO on the basis of exploratory trips and/or commercial fishing data. NAFO observers on board vessels help collect information on Estonia's commercial fishing. The state of fish stocks and fishing opportunities are generally closely related – to determine the total allowable catch (TAC), the precautionary approach is applied in the NAFO area, which should ensure the preservation of stocks and the ecosystem.

The impact of environmental conditions and interaction between species is increasingly taken into account when assessing stocks, i.e. the ecosystem approach to fisheries management is used and vulnerable marine ecosystems are protected. Therefore, 18 fishing grounds in the NAFO area were closed in 2012 to commercial fishing either because of an abundance of coral and sponges which exceeded the established reference levels or because of seamounts regarding which more information on the operation of ecosystems is needed (NAFO 2011). Due to precautions, these fishing grounds are expected to remain closed until 2014. Protected areas will be officially announced after the analysis of the data collected.

Fishing quotas are agreed between member states at the annual meetings of NAFO and NEAFC. At NAFO's annual meeting in 2011 the fishing quotas for 2012 were agreed and the current moratoria on fishing certain stocks were continued – Atlantic cod *(Gadus morhua) in* divisions 3L and 3NO; American plaice *(Hippoglossoides platessoides)* in divisions 3LNO and 3M; witch flounder *(Glyptocephalus cynoglossus)* in divisions 3L and 3NO; capelin *(Mallotus villosus) in division* 3NO; *and* shrimp *(Pandalus borealis)* in divisions 3NO and 3M (NAFO 2012). Also the total allowable catch was reduced for several stocks (Table 2).

As the stocks of many species are in a poor state, recovery plans have been established for certain stocks, which determine the conditions for the opening of the stocks for commercial fishing and for the careful management of freshly opened stocks. For example, a 15-year recovery plan for Greenland halibut *(Reinhardtius hippoglossoides)* has been implemented since 2003, and a plan for recovery of cod stocks in NAFO division 3NO has been implemented since 2007 (NAFO 2011a). In addition, a stock recovery plan has been established for American plaice, and a similar plan is being prepared for witch flounder. Stock recovery plans are also intended to be drawn up for 3LN redfish *(Sebastes* spp*)*, which was recently reopened for commercial fishing after a moratorium that lasted from 1998–2009 (inclusive), and 3M cod, which was under a moratorium from 1999–2009 (inclusive) (NAFO 2012, 2012a). The Greenland halibut recovery plan has been successful and fishing quotas were increased by 7% in 2011 for this species. However, Estonia's fishing quota for this species was reduced by 5% for 2012 once again, as the catch rate established in the recovery plan had declined by more than permitted (5%), indicating that the increase in biomass might not be persistent (NAFO 2012b). The quota for 3LN redfish was not changed in 2012, but the quota for 3M cod was reduced by 7% (Table 2).

Species are interrelated through dietary relationships. As the biomass of shrimp-eating fish has increased and environmental conditions have probably become less favourable for shrimp, shrimp stocks are in a poor state in NAFO division 3M. The moratorium on commercial fishing for 3M shrimp established

Table 2. Estonia's distant-water fishing quotas for 2005–2012, before charter arrangements and quota transfers, in tonnes and fishing days, by fishing ground, and change (%) compared to 2011

Species	Unit	Fishing ground	2005	2006	2007	2008	2009	2010	2011	2012	Change (%) in fishing quota from 2011 to 2012
Shrimp or northern prawn, *Pandalus borealis*, PRA	fishing day	NAFO 3M	1667	1667	1667	1667	1667	834	0	0	0
	tonne	NAFO 3L	144	245	245	278	334	334	214	134	–37
Atlantic redfishes nei, *Sebastes* spp, RED	tonne	NAFO 3M	1571	1571	1571	1571	1571	1571[1]	1571	1571	0
	tonne	NAFO 3LN	0	0	0	0	0	173	297	297	0
Northern shortfin squid, *Illex illecebrosus*, SQI	tonne	NAFO 3 and 4	128	128	128	128	128	128	128	128	0
Greenland halibut, *Reinhardtius hippoglossoides*, GHL	tonne	NAFO 3LMNO	380	371	321	321	321	321	345	328	–5
Raja rays nei, *Raja* spp, SKA	tonne	NAFO 3LNO	546	546	546	546	546	485	485	343	–29
Atlantic cod, *Gadus morhua*, COD	tonne	NAFO 3M	0	0	0	0	0	61	111	103	–7
Mackerel, *Scomber scombrus*, MAC	tonne	NEAFC	115	119	135	124	165	107	172	170	–1
Roundnose grenadier, *Coryphaenoides rupestris*, RNG	tonne	NEAFC	77	77	67	67	57	49	43	38	–12
Black scabbardfish, *Aphanopus carbo*, BSF	tonne	NEAFC	17	17	17	17	15	14	13	12	–8
Dogfish sharks nei, *Squalidae*, DGX	tonne	NEAFC	10	10	4	2	1[2]	0[3]	0[4]	0	0
Blue ling, *Molva dypterygia*, BLI	tonne	NEAFC	5	5	4	3	3	3	5	3	–40
Atlantic redfishes nei, *Sebastes* spp, RED	tonne	NEAFC	344	284	210	210	210	210	177	149[6]	–16
Greenland halibut, *Reinhardtius hippoglossoides*, GHL	tonne	NEAFC	10	8	6	6	4	3	2	2	0
Raja rays nei, *Raja* spp, SKA[5]	tonne	NEAFC					8	7	6	5	–17
Shrimp or northern prawn, *Pandalus borealis*, PRA	fishing day	Svalbard	377	377	377	377	377	377	377	377	0
Total	tonne		3347	3381	3254	3273	3740	3843	3946	3660	–7
	fishing day		2044	2044	2044	2044	2044	1211	377	377	0
Change in tonne quotas since 2011	%		–15	–14	–18	–17	–5	–3	0	–7	

[1] Estonia's revised quota was 841 tonnes, as the catches of 2009 exceeded the permitted quantity and the overfished quantity was counted against the quota for 2010.

[2] Exclusively for by-catches. No directed fishing for deep-sea sharks is permitted. [3] By-catches are permitted up to 10% of the quotas for 2009. [4] By-catches are permitted up to 3% of the quotas for 2009.

[5] Catches of cuckoo ray *(Leucoraja naevus)*, thornback ray *(Raja clavata)*, blonde ray *(Raja brachyura)*, spotted ray *(Raja montagui)*, small-eyed ray *(Raja microocellata)*, sandy ray *(Leucoraja circularis)* and shagreen ray *(Leucoraja fullonica)* are reported separately. Does not apply to undulate ray *(Raja undulata)*, common skate *(Dipturus batis)*, Norwegian skate *(Raja (Dipturus) nidarosiensis)* and white skate *(Rostroraja alba)*, which may not be retained on board and must be promptly released unharmed to the extent practicable. Fishermen are encouraged to develop and use techniques and equipment to facilitate the rapid and safe release of these species.

[6] May only be taken within the area bounded by the lines joining the following coordinates: 1. 64° 45'N 28° 30'W; 2. 62° 50'N 25° 45'W; 3. 61° 55'N 26° 45'W; 4. 61° 00'N 26° 30'W; 5. 59° 00'N 30° 00'W; 6. 59° 00'N 34° 00'W; 7. 61° 30'N 34° 00'W; 8. 62° 50'N 36° 00'W; 9. 64° 45'N 28° 30'W. May not be fished from 1 January to 9 May 2012.

Sources: MoE and EU Council Regulations (EC) No 1359/2008, 43/2009 and (EU) No 53/2010, 1225/2010, 57/2011, 44/2012.

in 2011 was continued and also applies in 2012. The moratorium continued to affect our distant-water fishers, as Estonia holds a significant portion of the NAFO 3M shrimp quota (Vetemaa 2008). Therefore, Estonian vessels were also fishing in NAFO subareas 0 and 1, where the stock and biomass of shrimp were in good condition in 2011. However, as the biomass has been declining in this region since 2004 and recruitment is low, while cod stocks have increased, it has been recommended to significantly reduce total catches of shrimp; Estonia will therefore have less fishing opportunities there (NIPAG 2012).

The number of quota transfers between countries grew during the period 2006–2012 from four transfers in 2006 to 23 transfers in 2012. Quotas are also transferred for the 3L shrimp. On average, three-quarters of the annual fishing opportunities of Estonian vessels for the 3L shrimp have been obtained through transfers (MoA 2013). The state of shrimp stock deteriorated in division 3L from 2008–2012. In 2010 and 2011 it was recommended to gradually limit catches and in 2012 quotas were reduced by 37%, which resulted in a quota roughly equivalent to that of 2005 (Table 2).

The state of fish stocks in the NEAFC fishing grounds is assessed by the ICES. Shrimp, redfish and mackerel are the most important species for Estonia in the North East Atlantic, as Estonia has higher quotas for these species, and shrimp is an unregulated species in the Barents Sea. In 2012, Estonian vessels caught only shrimp and cod (the latter as by-catch in shrimp fishing) in the Barents Sea and East Greenland waters in the NEAFC fishing grounds. Other fishing opportunities were exchanged for fishing opportunities in the North West Atlantic. Shrimp stocks continued to be in good condition in the NEAFC fishing grounds. Stock indicators had not changed much – the fishing mortality rate was low and stable, the biomass index was also stable and close to the mean value of historical biomass levels, while the recruitment index had declined from 2004–2008, but increased again from 2009–2012 (NIPAG 2012). Stocks of beaked redfish *(Sebastes mentella)* and golden redfish *(Sebastes marinus)* are managed separately in the NEAFC area. The stock of both redfish species remained in poor condition in 2012. It has been recommended to avoid directed trawling for this species until an increase in spawning stock biomass and in the abundance of juveniles is observed (ICES 2012a). For mackerel *(Scomber scombrus)* a management plan was adopted in 2008, but the recommendation is not being acted upon, as there are no effective agreements between the countries involved in the fishery. Mackerel stock was in good condition in 2012, but it has still been recommended to maintain the closed areas and seasons in future to support a continued increase in the stock (ICES 2012b). Directed fishing for many deep-water species and skates and rays is prohibited in the NEAFC area because the exploitation of stocks is estimated to exceed the sustainable level (ICES 2012c).

Assessment and scientific advice concerning stocks in the NAFO area are available on the website of NAFO (www.nafo.int). Materials on NEAFC fishing grounds can be found on the websites of NEAFC (www.neafc.org) and ICES (www.ices.dk, ICES Advice Book).

Estonian vessels can fish for unregulated species in international waters outside of the closed areas. Thus, after a three-year break (2007–2009) two vessels fished for several species of bony fish and squids in the South West Atlantic in 2012. There is no regional fisheries management organisation (RFMO) in the area, and no quotas have been allocated to Estonia there.

Catches and revenue

Shrimp was the target species for most of the vessels (4), but different fish species and occasionally squid species were also targeted. Besides their own quotas, Estonian vessels also used the shrimp quotas of the USA and Greenland and the fishing opportunities of Spain, Portugal and Poland in 2012 (Fisheries Information System of the MoA). As in 2010 and 2011, catches were landed in ports of Canada, Spain, Greenland, Iceland, Uruguay and Norway. In 2012, shrimp produced the biggest catches, followed by Argentine hake and shortfin squid (Table 3). In terms of generating revenue, shrimp has usually been followed by redfish and Greenland halibut. As catches have increased in the South West Atlantic and decreased in the North West Atlantic, cod fished in the North West Atlantic and North East Atlantic failed to make the top four in terms of either catch or revenue. Species caught in the South West Atlantic produced more revenue (Figure 1).

From 2005 to 2012, distant-water fishing vessels flying the flag of Estonia only fished in the Atlantic Ocean. They use only shrimp and cod fishing opportunities in the NEAFC area. Catches from the North West Atlantic area have changed the most: around 15,000 tonnes in 2005 and approximately 3,500 tonnes in 2012, but relatively persistently around 5,300 tonnes in the period 2009–2012.

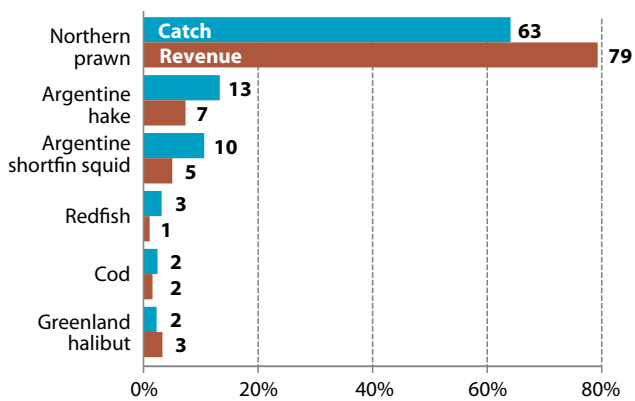
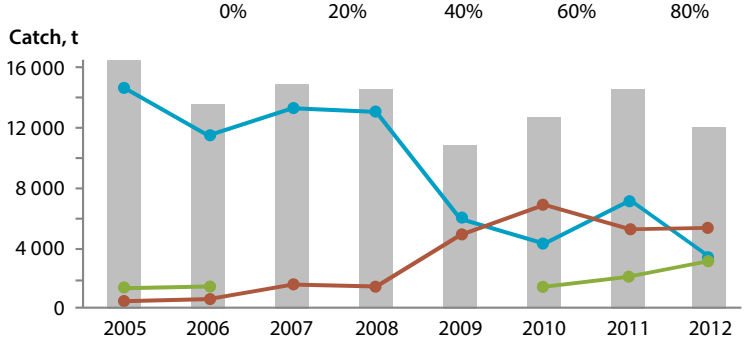


Figure 1. Proportion (%) of catch and revenue by main species in distant-water fishery sector in 2012 Source: MoA, UT EMI



	2005	2006	2007	2008	2009	2010	2011	2012
Total	16 539	13 617	14 930	14 559	10 881	12 699	14 590	11 990
North West Atlantic	14 690	11 515	13 332	13 086	5 979	4 329	7 146	3 444
North East Atlantic	494	633	1 598	1 473	4 903	6 906	5 318	5 340
South West Atlantic	1 355	1 469				1 464	2 126	3 206

Figure 2. Estonia's total distant-water fishery catches (t) by fishing ground, 2005–2012. Source: MoA

Table 3. Estonia's distant-water fishery catches (t) by species, 2005–2012

Species	2005	2006	2007	2008	2009	2010	2011	2012
Aesop shrimp, *Pandalus montagui*							858	
Blue antimora, *Antimora rostrata*			3					
Argentine shortfin squid, *Illex argentinus*	581	499				42	329	1248
Argentine hake, *Merluccius hubbsi*		700				1125	1395	1571
Patagonian grenadier, *Macruronus magellanicus*		73				135	92	< 1
Greenland shark, *Somniosus microcephalus*	9							
Baird's slickhead, *Alepocephalus bairdii*	64	158	9					
Rabbit fish, *Chimaera monstrosa*	4	2						
Atlantic halibut, *Hippoglossus hippoglossus*				3		3	3	10
American plaice, *Hippoglossoides platessoides*	47	34	33	77	29	9	36	37
Splendid alfonsino, *Beryx splendens*		4						
Atlantic wolffish, *Anarhichas lupus*				12	5			
Northern prawn, *Pandalus borealis*	12 381	9242	12 076	12 742	8587	9037	9919	7576
Silver hake, *Merluccius bilinearis*								< 1
Roundnose grenadier, *Coryphaenoides rupestris*	154	104	140					
Mediterranean slimehead, *Hoplostethus mediterraneus*		1						
Haddock, *Melanogrammus aeglefinus*	< 1							8
Cusk-eels nei, *Genypterus* spp	17	1						
Golden redfish, *Sebastes marinus*		104						
Alfonsinos nei, *Beryx* spp			1					
Pink cusk-eel, *Genypterus blacodes*		22					127	90
Southern blue whiting, *Micromesistius australis*							< 1	< 1
Northern shortfin squid, *Illex illecebrosus*		24			5	1		< 1
Atlantic redfishes nei, *Sebastes* spp	1111	1156	1040	1003	1748	1340	1075	368
Wolffishes nei, *Anarhichas* spp	74	63	10	2				
Hakes nei, *Merluccius* spp	700	6						
Black cardinal fish, *Epigonus telescopus*		< 1						
Black dogfish, *Centroscyllium fabricii*		4	6					
Beaked redfish, *Sebastes mentella*		396	684					
Antarctic rockcods, noties nei, *Nototheniidae*	56	127				58	76	57
Dogfish sharks nei, *Squalidae*	6		3	3		< 1		
Patagonian squid, *Loligo gahi*						44	69	175
Patagonian toothfish, *Dissostichus eleginoides*		< 1						
Tadpole codling, *Salilota australis*		32				1	2	1
Longnose velvet dogfish, *Centroscymnus crepidater*			3					
Witch flounder, *Glyptocephalus cynoglossus*	31	28	24	38	8	11	14	33
Portuguese dogfish, *Centroscymnus coelolpis*	7	7						
Red hake, *Urophycis chuss*	47	26	2			19		
Roughhead grenadier, *Macrourus berglax*	103	95	69	132	41	93	116	72
Raja rays nei, *Raja* spp	62	258	366	123	29	228	82	161
Rays, stingrays, mantas nei, *Rajiformes*	479							
Yellowtail flounder, *Limanda ferruginea*	20	6	25	33		4	13	31
Blue ling, *Molva dypterygia*	5	3	7					
Black scabbardfish, *Aphanopus carbo*	11	6	7					
Greenland halibut, *Reinhardtius hippoglossoides*	534	373	365	299	300	441	279	266
Threebearded rockling, *Gaidropsarus ensis*					1	3		
Cod, *Gadus morhua*	33	52	25	73	128	93	105	285
Spotted wolffish, *Anarhichas minor*						12		
White hake, *Urophycis tenuis*	1		32	19				< 1
Sharks, rays, skates, etc. nei, *Elasmobranchii*		11						
Total	**16 539**	**13 617**	**14 930**	**14 559**	**10 881**	**12 699**	**14 590**	**11 990**

Sources: MoA and MoE

Table 4. First sales prices of distant-water fishery species (€ kg^{-1}) in 2011 and 2012

Species	2011	2012
Argentine shortfin squid	2.18	1.38
Argentine hake	2.11	1.60
Patagonian grenadier	1.58	0.93
American plaice	2.02	1.84
Northern prawn	2.29	3.63
Pink cusk-eel	4.43	2.00
Atlantic redfishes nei	1.52	0.97
Antarctic rockcods, noties nei	1.15	0.95
Patagonian squid	2.45	1.27
Tadpole codling	0.89	1.92
Witch flounder	1.13	2.00
Roughhead grenadier	0.35	0.50
Raja rays nei	2.00	1.75
Yellowtail flounder	2.51	2.00
Greenland halibut	4.95	4.24
Cod	3.63	1.85

Source: UT EMI

The quantities caught in the North East Atlantic increased from 2005–2012 and reached more or less the same levels as in the North West Atlantic in the period 2009–2012. In the South West Atlantic, catches have increased during the last three years. The total catch for 2012 was at the level of 2009 and 2010 (Figure 2).

The average first sales prices were calculated on the basis of catches and sales revenues rather than the annual average (Table 4). The Estonian distant-water fishery sector's revenue from sales of catches amounted to around 35 million euros in 2012, which was somewhat higher than in the period 2005–2011. The employees of distant-water fishery companies totalled 79 in 2012, but a considerable proportion (20–80%) are employed by foreign companies (MoA 2013).

Outlook

The shrimp stock of the third division of the North West Atlantic area that so far has offered the biggest fishing opportunities is in a deteriorating condition and partly under a moratorium. Therefore, the Estonian distant-water fishery sector has to look for other ways of engaging fishing vessels. Exchanges of quotas with other countries may also become more frequent, as the decline in fishing opportunities in the area may render fishing unprofitable for owners of small quotas and they may be more willing to surrender their quotas.

The shrimp stock in the Barents Sea, which is in good condition, is a reasonable alternative to the North West Atlantic fishing area, even though the fishing ground is limited to international waters between the exclusive economic zones of Norway and Russia. In the case that shrimp moves out of the area, vessels would not be able to follow them, unless agreements were signed with third countries. The first signs of shrimp moving out of international waters, heading east, have already been observed (NIPAG 2012).

The South West Atlantic fishing area will offer fishing opportunities should these opportunities shrink in the North West and North East Atlantic.

Baltic Sea fisheries

COASTAL FISHERY IN THE BALTIC SEA

1858 coastal fishermen fished in the Baltic Sea in 2012. According to the 'Estonian Fishery 2011' yearbook, in 2011 the number of coastal fishermen listed on Baltic Sea fishing permits amounted to 1744 and the decline in the number of fishermen was most remarkable in Lääne County. However, the database has been updated and it has become clear that the number of active coastal fishermen remained at broadly the same level in the last three years, and in 2011 the number of coastal fishermen listed on fishing permits was 1863.

While the number of coastal fishermen declined during the period of booming economic growth as they found better-paid jobs, the number started to increase again when the recession hit (Figure 3). As in previous years, fishing is the main source of income for around 10% of coastal fishermen. The number of fishermen continued to be highest in Pärnu and Saare counties, followed by Harju and Hiiu counties. By county, the numbers of coastal fishermen entered on fishing permits were as follows in 2012:

Saare County (incl. Ruhnu) 395
Pärnu County (incl. Kihnu and Manija) 393
Harju County 302
Hiiu County (incl. Vormsi) 288
Lääne County 256
Lääne-Viru County 134
Ida-Viru County (excl. Lake Peipsi) 122

Source: Fisheries Information System of the MoA

Since one coastal fisherman can have fishing permits in several counties or be entered on the fishing permits of several regions, the number calculated on the basis of counties exceeds the actual number of coastal fishermen.

According to the data of the Fishing Vessel Register, Estonian coastal fishermen used 1387 fishing vessels on the Baltic Sea in 2012.

In 2012 the biggest catches were produced by herring, followed by perch, smelt, flounder, pikeperch and roach (Table 5, Figure 4). While in 2011 fifth place was held by garfish, in 2012 the catch of garfish remained virtually non-existent because the herring quota was used up early. Namely, garfish is caught with the same pound nets as herring, and the use of these nets must be discontinued once the herring quota is exhausted. The total catch of coastal fishermen decreased from 10,350 tonnes in 2011 to 8729 tonnes in 2012. Thus, the total catch of coastal fishermen has declined steadily over the last three years.

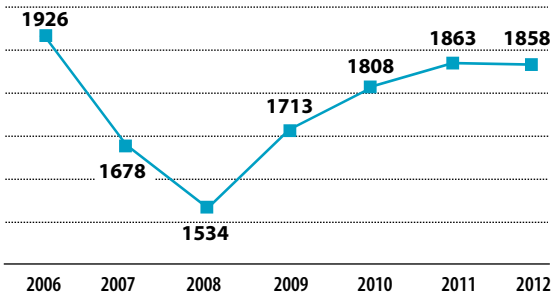


Figure 3.
Number of coastal fishermen fishing on Baltic Sea, 2006–2012
Sources: MoE, MoA

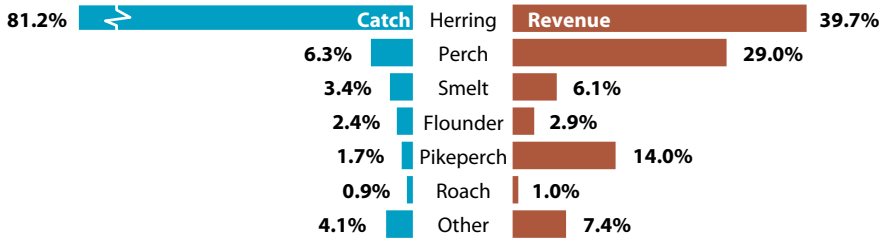


Figure 4. **Proportion (%) of catch and revenue in coastal fishing by species in 2012**
Source: MoA

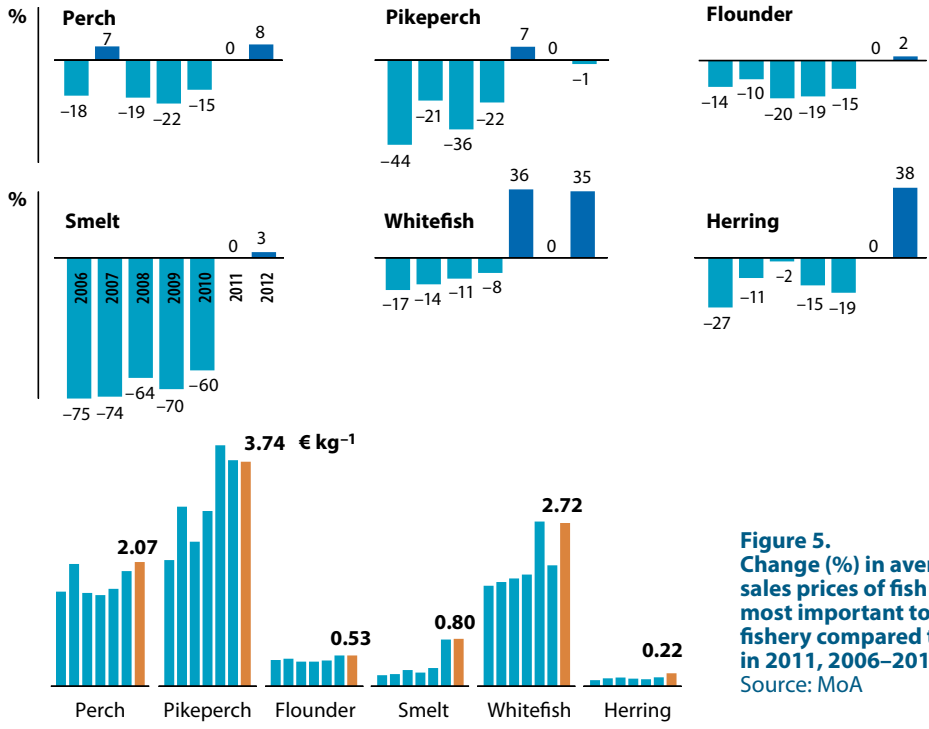


Figure 5.
Change (%) in average first sales prices of fish species most important to coastal fishery compared to prices in 2011, 2006–2012
Source: MoA

Based on average first sales prices published in the official publication Ametlikud Teadaanded, coastal fishermen earned the most from herring fishing in 2012, while perch was the most lucrative species in 2010 and 2011. In terms of

Table 5. Coastal fishing catches (t) and proportion (%) of total catch from Baltic Sea from 2010–2012 by species

Species	2010		2011		2012	
	Catch	Proportion (%)	Catch	Proportion (%)	Catch	Proportion (%)
Perch	878.76	7.8	795.84	7.7	549.85	6.3
Eel	3.45	<0.1	2.21	<0.1	1.91	0.0
Eelpout	0.81	<0.1	0.09	<0.1	0.39	0.0
Turbot	0.18	<0.1	0.10	<0.1	0.08	0.00
Atlantic mackerel	<0.01	<0.1	0.00	<0.1	0.00	0.0
Pike	22.77	0.2	32.07	0.3	35.38	0.4
Gibel carp	51.32	0.5	47.64	0.5	59.66	0.7
Lamprey	0.57	<0.1	0.89	<0.1	0.36	0.0
Carp	0.14	<0.1	0.08	<0.1	0.12	0.0
Ruff	32.36	0.3	60.80	0.6	51.18	0.6
Sprat	0.15	<0.1	0.64	<0.1	0.14	0.0
Pikeperch	73.36	0.7	110.52	1.1	146.83	1.7
Bream	3.58	<0.1	7.55	0.1	11.10	0.1
Flounder	269.77	2.4	244.99	2.4	212.93	2.4
Tench	2.26	<0.1	2.96	<0.1	3.32	0.0
Burbot	1.30	<0.1	1.62	<0.1	1.66	0.0
Salmon	3.80	<0.1	4.42	<0.1	5.31	0.1
Baltic prawn	0.03	<0.1	0.00	<0.1		
Sea trout	12.21	0.1	13.40	0.1	17.14	0.2
Four-horned sculpin	0.03	<0.1	0.02	<0.1	0.07	0.0
Whitefish	15.54	0.1	14.62	0.1	20.60	0.2
Sea lamprey	0.03	<0.1	0.00	<0.1	0.00	0.0
Smelt	417.31	3.7	120.36	1.2	298.34	3.4
Lumpfish	<0.01	<0.1	0.00	<0.1	0.00	0.0
Sabre carp	<0.01	<0.1	0.00	<0.1	0.00	0.0
Silver bream	21.60	0.2	22.53	0.2	33.25	0.4
Stickleback	0.02	<0.1	0.04	<0.1	0.00	0.0
Rudd	1.19	<0.1	4.86	<0.1	1.62	0.0
Herring	9236.65	82.2	8597.27	83.1	7088.92	81.2
Ide	6.30	0.1	6.13	0.1	4.47	0.1
Roach	66.48	0.6	83.24	0.8	77.80	0.9
Dace	<0.01	<0.1	0.02	<0.1	0.00	0.0
Cod	3.69	<0.1	3.50	<0.1	3.41	0.0
Garfish	86.05	0.8	117.74	1.1	25.04	0.3
Bleak	0.11	<0.1	0.06	<0.1	0.34	0.0
Rainbow trout	0.09	<0.1	0.14	<0.1	0.07	0.0
Vimba bream	29.82	0.3	50.08	0.5	53.26	0.6
Twaite shad	0.03	<0.1	0.00	<0.1	0.01	0.0
Round goby	1.12	<0.1	4.05	<0.1	16.91	0.2
Total	**11 242.89**	**100.0**	**10 350.50**	**100.0**	**8721.48**	**100.0**

Source: MoA

profitability, herring was followed by perch, pikeperch, smelt, flounder, sea trout, whitefish and pike in 2012 (Table 7). Compared to 2011, the first sales prices of herring (37%), whitefish (34%) and sea trout (18%) increased the most. The first sales prices of other key species remained almost the same as before (Table 6, Figure 5). Based on first sales prices, the sales revenues of coastal fisherman are estimated to have amounted to 3.35 million euros in 2010, 3.87 million euros in 2011 and 3.93 million euros in 2012. A slight rise in first sales prices has thus offset the declining catches.

Table 6. Average first sales prices of fish (€ kg^{-1}), 2006–2012

Species	2006	2007	2008	2009	2010	2011	2012
Perch	1.58	2.05	1.56	1.50	1.63	1.92	2.07
Eel	5.92	5.68	5.58	5.14	5.72	6.56	7.35
Eelpout	0.06		0.13		0.36	0.14	0.21
Pike	0.84	0.92	0.98	1.05	1.05	1.33	1.43
Gibel carp	0.14	0.12	0.14	0.12	0.11	0.11	0.12
Lamprey	1.95	1.96	1.88	1.76	1.68	2.96	3.64
Carp	0.40	0.31	0.27	0.74	0.94	1.11	0.78
Ruff	0.06	0.10	0.08	0.09	0.13	0.16	0.20
Sprat	0.12	0.15	0.17	0.15	0.13	0.17	0.20
Crucian carp	0.11	0.04		0.32	0.30	0.25	0.21
Pikeperch	2.10	2.99	2.41	2.92	4.01	3.76	3.74
Bream	0.35	0.38	0.40	0.49	0.45	0.56	0.58
Flounder	0.45	0.47	0.42	0.42	0.44	0.52	0.53
Tench	0.73	0.76	0.95	0.80	0.86	1.09	1.01
Burbot	0.55	0.52	0.56	0.61	0.63	0.76	0.77
Salmon	2.79	1.35	3.29	1.64	2.63	3.95	4.09
Baltic prawn				2.36			
Sea trout	1.87	2.55	2.05	1.47	1.68	3.00	3.54
Whitefish	1.67	1.73	1.79	1.87	2.74	2.02	2.72
Smelt	0.19	0.20	0.28	0.23	0.31	0.78	0.80
Silver bream	0.07	0.07	0.07	0.07	0.09	0.12	0.11
Lake Peipsi whitefish	1.31	0.81	0.99	1.04	0.94	1.00	1.92
Lake Peipsi smelt	0.41						
Rudd	0.11	0.03	0.13	0.07	0.04	0.06	0.06
Herring	0.12	0.14	0.16	0.14	0.13	0.16	0.22
Vendace		1.04	1.01	1.43	2.88		3.44
Ide	0.28	0.40	0.39	0.42	0.46	0.64	0.48
Roach	0.16	0.28	0.39	0.39	0.44	0.48	0.50
European chub				0.19			
Cod	1.43	0.80	0.55	1.10	0.92	1.03	0.95
Garfish	0.28	0.37	0.38	0.43	0.47	0.71	0.89
Bleak			0.13	0.03	0.13		0.10
Rainbow trout				1.92			
Vimba bream	0.20	0.28	0.23	0.23	0.38	0.43	0.43
Round goby		0.20	0.25	0.34	0.32	0.39	0.20

Source: official publication Ametlikud Teadaanded

Table 7. Value (10^3 euros) of coastal fishing catches from Baltic Sea and proportion (%) of total value in 2011 and 2012 by species

Species	2011		2012	
	Value	Proportion (%)	Value	Proportion (%)
Perch	1528.02	39.5	1138.04	29.0
Eel	14.48	0.4	14.02	0.4
Eelpout	0.01	< 0.1	0.08	< 0.1
Turbot			0.04	< 0.1
Pike	42.65	1.1	50.63	1.3
Gibel carp	5.24	0.1	8.03	0.2
Lamprey	2.62	0.1	1.32	< 0.1
Carp	0.09	< 0.1	0.10	< 0.1
Ruff	9.73	0.3	10.24	0.3
Sprat	0.11	< 0.1	0.03	< 0.1
Pikeperch	415.54	10.7	549.10	14.0

(continued on next page)

(Table 7, continued)

Species	2011		2012	
	Value	Proportion (%)	Value	Proportion (%)
Bream	4.23	0.1	6.44	0.2
Flounder	127.39	3.3	112.83	2.9
Tench	3.23	0.1	3.35	0.1
Burbot	1.23	< 0.1	1.28	< 0.1
Salmon	17.47	0.5	21.82	0.6
Sea trout	40.20	1.0	61.18	1.6
Whitefish	29.54	0.8	55.56	1.4
Smelt	93.88	2.4	238.63	6.1
Silver bream	2.70	0.1	3.66	0.1
Rudd	0.29	< 0.1	0.10	< 0.1
Herring	1375.56	35.6	1559.56	39.7
Ide	3.92	0.1	2.14	0.1
Roach	39.96	1.0	38.90	1.0
Cod	3.60	0.1	3.24	0.1
Garfish	83.60	2.2	22.28	0.6
Bleak			0.03	< 0.1
Vimba bream	21.54	0.6	22.90	0.6
Round goby	1.58	< 0.1	3.38	0.1
Total	3868.42	100.0	3928.91	100.0

Source: official publication Ametlikud Teadaanded, MoA

Dynamics of coastal fishing catches in different parts of the Baltic Sea

Gulf of Finland

Gill nets and trap nets are the main fishing gear in coastal fishing. The biggest catches taken from the Gulf of Finland with these nets are those of herring, but also of flounder, perch, round goby, smelt and whitefish. As in previous years, the catches of most key species declined in 2012 (Table 8). Catches of round goby grew sharply (more than four-fold) compared to 2011. Herring also produced the biggest sales revenue (around 154,000 euros) in 2012, followed by perch (around 50,000 euros), sea trout (around 38,000 euros) and flounder (around 36,000 euros).

Herring is caught in the Gulf of Finland mainly using trap nets. Although herring catches were more abundant from 2009–2012 than in 2007 and 2008, they have consistently decreased over the last three years. Flounder is usually caught using gill nets in the western part of the gulf. Flounder stock is decreasing, as evidenced by the shrinking catches during the last three years. Perch is mostly caught using gill nets, with the proportion of trap net catches varying from year to year. Perch catches, too, have been steadily declining since 2009, and the catch of 2012 was the lowest of the period 2007–2012, accounting for only half of the average catch. Whitefish is caught in the Gulf of Finland mainly with gill nets.

Whitefish catches declined from 2007–2011, but the catch of 2012 was bigger than those in the two preceding years, while not exceeding the average of the period. Smelt is generally also caught using gill nets. The smelt catch, which had decreased for two consecutive years (2010 and 2011), grew in 2012 more than three-fold, but remained below the average of the period. Sea trout and salmon are mainly caught with gill nets as well.

In 2012 the catch of these valuable fish species was close to the average of the period 2007–2012. Catches of round goby have increased quickly and consistently: in 2012, the catch of this alien species held fourth place. In future, round goby might start competing for food with other fish species, particularly demersal fish such as flounder and eelpout, and there is no solution to this problem.

In summary, the total catch taken in 2012 was lower than the average catch of the period 2007–2012 and, if not for herring as the mass fish, it was also the smallest of the period.

High seas

Fishing gear used in coastal regions towards the Baltic Proper near Saaremaa and Hiiumaa includes gill nets, trap nets, longlines and seine nets. The species caught are dominated by flounder, followed by herring, perch, roach and sea trout (Table 9). While the catches of flounder have been the highest in each year during the period from 2007–2012, the ranking of other species has varied. Just as in 2011, flounder produced the biggest sales revenue in 2012 (around 65,000 euros), followed by sea trout (around 16,000 euros). Revenue from perch fishing decreased considerably (from around 21,000 euros in 2011 to around 12,000 euros in 2012). Sales revenue generated by other species was very low.

In flounder fishing the main fishing gear included gill nets (61% of the catch), seine nets (32%) and trap nets (7%) over the last six years. Open-sea flounder catches have decreased consistently during the last three years, falling short of the average for the period. The flounder stock is shrinking due to the deteriorating situation in the spawning grounds. Until 2010, second and third positions in terms of catch volume were shared by herring and garfish in this area. The latter is caught primarily using trap nets. Garfish catches have decreased in the area two years in a row, and the lowest catch of the data series was taken in 2012. This setback placed herring in second position in terms of catch volume both in 2012 and in the comparison of average values of the data series. Trap nets are the main fishing gear in herring fishery, but the share of gill nets is also higher in high seas than in other parts of the sea. The herring catch of 2012 was higher than in the preceding year and also exceeded the average of the period 2007–2012. In terms of catch volume, perch continued to be the most important freshwater fish, but the catch taken in 2012 was almost twice as low compared to the record quantity caught in 2011. While the roach catch also decreased slightly in 2012, its average catch still exceeded that of perch.

In summary, the total catch taken in 2012 from coastal regions towards the Baltic Proper near Saaremaa and Hiiumaa was the lowest of the entire period. The main reason for this was the low flounder and garfish catch.

Väinameri Sea

Fishing gear used in the Väinameri Sea includes gill nets and trap nets. Ranked on the basis of catch volume, herring, perch, Gibel carp, pike, roach and silver bream were most commonly caught in 2012 (Table 10). Catches of all these species, except herring, increased compared to 2011. The greatest sales revenues in 2012 were produced by perch (around 67,000 euros), pike (around 35,000 euros)

and herring (around 31,000 euros).

Herring is mostly caught using trap nets. Herring catches were big in 2009 and 2010, but decreased over the next two years. The herring catch of 2012 was lower than in the three preceding years, but close to the average of the data series. The catch of garfish taken with trap nets in 2012 was the lowest of the data series and decreased by 3.5 times compared to 2011. Perch is fished mainly using gill nets, but considerable quantities are caught with trap nets as well. Catches fluctuated strongly from 2007–2012, as fishing for perch relied on just a few year classes; the catch of 2012 was the highest of the period observed. On account of the catch for 2012, Gibel carp, caught mostly using gill nets, remained the third most important fish species in the Väinameri Sea in the period 2007–2012 in terms of quantities caught. The catch of perch exceeded that of Gibel carp in 2012, while the garfish catch was considerably lower than usual. The rapid increase in the population of Gibel carp has ended in the area. The proportion of gill nets and trap nets is more or less equal in roach fishing, but the proportion of gill nets has grown during the last two years. The roach catch of 2012 was the biggest of the period observed and of the same magnitude as the catch of 2011; catches taken in the four preceding years were more or less equal. Pike is mainly caught using gill nets, with the proportion of trap nets in the catch accounting for around half as much. Current pike catches are not comparable to past catches taken from the Väinameri Sea, but have increased remarkably in the last three years, with the catch for 2012 being the biggest of the last six years. Ide and eel catches continued to shrink in 2012.

In summary, catches were significantly lower in the Väinameri Sea in 2007 and 2008 than from 2009–2012. This is mainly due to better herring catches from 2009–2012. However, even if herring is not taken into account, the overall catch was the biggest in 2012.

Gulf of Riga

The most common fishing gear used in the Gulf of Riga (except Pärnu Bay) are gill nets and trap nets, with seines and longlines being used to a lesser extent. In 2012, the biggest catches taken in the Gulf of Riga were those of herring, followed by perch, roach and flounder (Table 11). Perch (around 307,000 euros) and herring (around 175,000 euros) produced the biggest sales revenues in 2012.

Herring is caught in the Gulf of Riga mostly with trap nets and less so with gill nets. The herring catch of 2012 was the lowest of the data series for the period 2007–2012 (declining by about 40% compared to the previous year). Gill nets are preferred in perch fishing, but considerable quantities are also caught using trap nets. Catches were relatively stable during the period 2007–2010, but decreased over the next two years, with the catch of 2012 reaching the lowest level of the period observed. Trap nets are used more than gill nets in roach fishing. The roach catch of 2012 exceeded the average of the data series.

Flounder is mostly caught with trap nets in the Gulf of Riga, but in 2010 and 2011 considerable quantities were also taken with seine nets. Flounder catch decreased in both 2011 and 2012. According to official statistics, ruff is caught mainly with gill nets, and on a much smaller scale also with trap nets. The ruff catch of 2012 was of the same magnitude as in the previous year, but the proportion of trap nets rose considerably in ruff fishing. The rapid increase in the abun-

dance (yield) of Gibel carp is likely to have ended in the Gulf of Riga. In pike fishing the prevalence of trap nets observed in the three preceding years was replaced by a preference for gill nets in 2012. While pike catches have increased during the last three years, the catch of 2012 was only 20 kg bigger than the catch of 2011.

In summary, the total catch of 2012 was the lowest of the six-year period. If herring is not taken into account, a record amount of fish was caught in the Gulf of Riga in 2009. The total catch of 2012, excluding herring, was the lowest of the data series for other species as well.

Pärnu Bay

Fishing gear used in Pärnu Bay includes gill nets, trap nets, seines and longlines. The biggest six-year average catches were produced by herring, perch, smelt, pikeperch, vimba bream and ruff (Table 12). Catches of these species were the biggest in 2012, too, and their ranking order in terms of catch volumes was the same. Unlike in 2011, herring generated the biggest sales revenue in 2012 (around 1,198,000 euros).

The catch of perch, which had produced the biggest sales revenue in 2011, was considerably lower in 2012 and thus sales revenue declined as well (around 702,000 euros in 2012). Perch was followed by pikeperch (around 535,000 euros), smelt (around 229,000 euros) and vimba bream (around 19,000 euros). In terms of catch volumes and sales revenue, Pärnu Bay is the most important coastal fishing area of Estonia.

Herring is caught mainly using trap nets and its catches fluctuated greatly in the period 2007–2012. The herring catch of 2012 was lower than in the preceding four years and remained below the average of the period. Catches greatly depend on the weather prevailing in the fishing period as well as on coastal fishing quotas. Trap nets and gill nets are used in equal shares in perch fishing. Perch catches have declined three years in a row and the catch of 2012 was the lowest of the last six years. This decline may be due to excessively intensive exploitation of the stock. Compared to 2011, the catch of smelt increased more than twice despite the catch limitation that has taken effect, but it did not reach the level of any of the catches taken in the years 2007–2010. In addition to the state of stocks, commercial fishing catches of smelt during the spawning period also depend on the hydro-meteorological conditions (including ice conditions) prevailing at the time of fishing to a great extent. A decline in stocks is obvious, however. Almost all of the smelt catch is taken using trap nets. Also garfish is mostly caught using trap nets. The largest garfish catch from 2007–2012 was taken from Pärnu Bay in 2011 (49,349 kg). The catch of 2012 was only 127 kg, because garfish could not be fished after the exhaustion of the herring quota.

Hopefully a solution will be found that will enable the garfish resource to be used in future.

In summary, catches taken from Pärnu Bay in the period 2007–2012 fluctuated significantly. The total catch of the last three years is lower than the average catch of six years. The total catch has been most affected by mass species – herring and smelt. If these species are not taken into account, the total catch of all other fish species in 2012 was only smaller than the catch of 2008.

Table 8. Species composition and catches (kg) of commercial fishing in Gulf of Finland (ICES subdivision 32) by coastal fishing gear, 2007–2012

Species	2007				2008				2009			
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total
Perch	11 119	24 876	6	36 000	20 821	56 185		77 005	34 724	37 763	29	72 516
Eel	2 417	13	15	2 444	2 102	4	7	2 113	1 714	21	4	1 739
Eelpout	43	5		48	1			1	15	2		18
Atlantic mackerel												
Grayling										1		1
Pike	120	1 545		1 664	111	1 453		1 564	161	1 176		1 337
Gibel carp	208	5 053		5 260	334	5 593		5 926	470	4 128		4 598
Brown trout												
Lamprey		46		46								
Turbot		12		12		32		32	11	42		53
Carp						1		1		8		8
Ruff	45	52		97	5	152		157	2	180		182
Sprat					35	178		213	80	1		81
Crucian carp									5	85		90
Pikeperch	159	2 262		2 420	211	11 011		11 222	555	418		973
Bream	1 397	1 573		2 970	1 015	2 017		3 032	948	884		1 831
Flounder	4 961	99 243	91	104 294	5 113	80 972	55	86 139	5 120	96 368	69	101 557
Tench	1	5		5	2	3		4	4	75		79
Burbot	39	53		92	5	43		48	5	18		22
Salmon	731	3 091		3 822	666	3 443		4 108	638	3 002		3 640
Sea trout	1 560	11 629		13 189	430	7 841		8 271	459	8 603		9 062
Four-horned sculpin						9		9				
Longspined bullhead												
Whitefish	1 263	20 495		21 758	917	22 195		23 112	825	14 177		15 003
Smelt	417	15 110		15 527	492	21 285		21 777	530	20 309		20 838
Lumpfish												
Sabre carp												
Silver bream	160	695		855	326	460		786	539	461		1 000
Thicklip grey mullet												
Rudd	13	12		24		68		68	14	10		24
Herring	610 926	2 075		613 002	553 087	2 905		555 992	1 132 459	7 511		1 139 971
Ide	14	199		213	61	342		403	60	250		310
Roach	526	2 136		2 662	499	2 318		2 817	1 246	3 525		4 771
Dace						1		1				
Cod	20	66		86	22	832		854	8	1 872	2	1 882
Garfish	9 377	189	1	9 567	1 318	31		1 349	6 535	194		6 729
Bleak	41	3		44	51	11		62	27			27
Rainbow trout	6	104		110	22	203		224	8	173		181
Vimba bream	377	3 624		4 000	234	2 758		2 991	1 118	700		1 818
Twaite shad												
Round goby		89		89	4	360		364	22	464	6	492
Total	**645 937**	**194 252**	**112**	**840 300**	**587 880**	**222 702**	**62**	**810 644**	**1 188 298**	**202 422**	**110**	**1 390 830**

Source: MoA

	2010				2011				2012				
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	2007–2012 Average
	16 598	33 467		50 066	16 598	20 169		36 767	11 287	13 103		24 390	49 457
	1 317	54	2	1 373	760	10	1	772	646	14		660	1 517
	7	2		9	3	8		11	15	1		16	17
		1		1	1			1					0
													0
	225	1 540		1 766	280	1 781		2 060	360	1 972		2 333	1 787
	947	3 575		4 522	294	4 315	4	4 613	1 142	6 938		8 080	5 500
										5		5	1
						14		14		3		3	10
	22	50		73	1	10		11	1	34		35	36
	8	8		16		11		11		23		23	10
	24	17		41	68	61		129	93	127		220	138
	2			2	599			599	12	12	10	34	155
	219	873		1 092		41		41	6	213		218	240
	579	446		1 025	260	4 362		4 622	119	579		697	3 493
	600	317		918	445	409		855	310	604		914	1 753
	7 535	88 171	20	95 725	4 950	78 489	2	83 441	4 653	62 896		67 548	89 784
	115	29		144	78	34		112	49	13		62	68
		10		10	5	7		12	7	19		26	35
	614	1 879		2 493	371	2 330		2 701	779	2 710		3 490	3 376
	1 143	8 040		9 182	1 558	8 288		9 846	924	9 670		10 594	10 024
		31		31		11		11	11	56		67	20
						2		2					0
	727	10 064		10 791	530	8 310		8 840	428	11 125		11 553	15 176
	427	9 404		9 831	128	3 509		3 637	427	11 711		12 137	13 958
		1		1									0
		1		1									0
	332	150		482	58	448		506	345	182		527	693
										2		2	0
	235	4		239	415	92		507	125	317		442	217
	1 095 410	3 031		1 098 441	799 189	1 912		801 101	696 177	2 274	5	698 456	817 827
	50	158		208	88	39		127	7	58		64	221
	1 785	1 043		2 828	1 096	2 906		4 002	642	2 470		3 112	3 365
													0
	67	2 057		2 124	11	2 054		2 065	20	1 425		1 444	1 409
	13 092	68		13 160	11 067	126		11 194	5 061	72		5 134	7 855
	29	2		31	27			27	57	70		127	53
	2	74		76	3	82		85	3	36		38	119
	915	699		1 613	420	927		1 347	107	1 169		1 277	2 174
		13		13						6		6	3
	235	878	8	1 121	3 557	485	9	4 051	16 026	783		16 809	3 821
	1 143 260	**166 156**	**30**	**1 309 445**	**842 860**	**141 241**	**16**	**984 117**	**739 839**	**130 687**	**15**	**870 541**	**1 034 313**

Table 9. Species composition and catches (kg) of commercial fishing in Baltic Proper (ICES subdivisions 28.2 and 29.2) by coastal fishing gear, 2007–2012

Species	2007					2008					2009				
	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total
Perch	1 018	2 507			3 525	494	1 472		8	1 974	1 300	3 747	80	2	5 129
Eel	733	7		19	759	454			2	456	520	6		34	560
Eelpout	19				19	6				6	22	2			24
Pike	528	923	2		1 453	496	974			1 470	548	653			1 201
Gibel carp	581	1 316	6		1 902	219	787		2	1 008	464	1 189			1 652
Turbot												1			1
Carp		13			13										
Ruff	34	7			41	19	6			25	39	4			43
Sprat		0			0						15				15
Crucian carp															
Pikeperch	1				1		2			2					
Bream	7				7	1				1	1	3			4
Flounder	12 419	98 734	70 031	2	181 186	12 083	97 313	51 187	38	160 621	9 636	100 758	50 888	9	161 291
Tench	53	53			106	2	1			3	8	2			10
Burbot	596	589			1 186	270	267			536	460	200			660
Salmon	10	890			900	15	766			781	14	957			971
Sea trout	40	3 153			3 193	54	2 777			2 831	93	3 798			3 891
Four-horned sculpin		7			7		4			4		5			5
Whitefish	32	2 535			2 567	45	2 158			2 203	24	1 375			1 399
Smelt		2			2		30			30		3			3
Lumpfish		1			1		2			2					
Sabre carp															
Silver bream		20			20						0	84			84
Thicklip grey mullet		3			3										
Rudd	68	1			69	29				29	20	1			21
Herring	5 910	868			6 778	5 499	1 853			7 351	10 875	3 763			14 638
Gudgeon															
Ide	325	1 528	20	4	1 877	468	3 146			3 614	566	1 987		11	2 564
Roach	3 332	2 023	10		5 365	2 351	2 729		5	5 085	2 700	1 780	720		5 199
Dace		0			0										
Cod	45	534			579	213	811		4	1 028	207	1 472			1 679
Garfish	15 764	604		11	16 379	8 485	830		10	9 325	6 270	310		12	6 592
Bleak	17				17	25	5			30	12	2			13
Rainbow trout	2	75			77	5	80			85	13	48			61
Vimba bream	1	4			4		4			4		4			4
Twaite shad	1				1										
Round goby															
Total	**41 534**	**116 395**	**70 069**	**36**	**228 034**	**31 232**	**116 016**	**51 187**	**69**	**198 504**	**33 805**	**122 153**	**51 688**	**68**	**207 714**

Source: MoA

	2010					2011					2012					
	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	2007–2012 Average
	1 058	2 664	115	30	3 867	2 124	8 936		3	11 063	1 673	4 272			5 945	5 251
	381	2		9	391	254			5	259	347				347	462
	19				19	1				1	3				3	12
	1 008	1 214		20	2 242	1 185	1 472		5	2 661	758	595			1 353	1 730
	815	751		14	1 580	968	2 010			2 978	947	2 178			3 124	2 041
	25	84			109		91			91		47			47	41
							15			15						5
	11	12			23	87	55			142	132	2			135	68
						8	15			23						6
												0			0	0
							1			1						1
	2				2	3	124			127	1				1	24
	8 618	83 237	51 916	71	143 842	14 139	92 281	29 850	2	136 271	8 085	77 788	36 810	1	122 684	150 983
	11	13		7	31	16	204			220	7	23			29	66
	392	271		10	674	613	399			1 012	420	84			504	762
	12	369			381	8	359			366	6	479			485	647
	117	1 863			1 979	141	2 231			2 372	70	4 439	40		4 549	3 136
							1			1						3
	25	1 180			1 205	22	2 013			2 036	182	2 476			2 658	2 011
		7			7		14			14	2				2	10
							1			1						1
		1			1											0
							5			5	0	190			190	50
																0
	30	9			39	87	94			181	193	90			283	103
	5 728	1 895		22	7 645	3 418	1 846			5 264	6 123	3 468			9 591	8 545
						1				1						0
	741	1 849	8	32	2 629	827	2 820			3 646	571	1 683			2 253	2 764
	3 965	1 751		13	5 729	3 335	3 584			6 919	3 071	2 197			5 269	5 594
																0
	199	909			1 108	258	819		13	1 089	251	1 208			1 460	1 157
	7 827	253		10	8 090	4 559	427			4 986	1 865	298		27	2 190	7 927
	38	7			45	2	5			7	9	1			10	20
	3	14			18	8	27			35	12	19			31	51
	5	7			12	21	34			55	0	7			7	14
	11	1			12											2
												1			1	0
	31 040	**98 363**	**52 039**	**238**	**181 679**	**32 081**	**119 882**	**29 850**	**28**	**181 841**	**24 727**	**101 545**	**36 850**	**28**	**163 150**	**193 487**

Table 10. Species composition and catches (kg) of commercial fishing in Väinameri Sea (ICES subdivision 29.4) by coastal fishing gear, 2007–2012

Species	2007				2008				2009			
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total
Perch	1 825	18 802	46	20 673	2 031	9 551	25	11 608	2 519	12 038	14	14 571
Eel	631	18	13	662	637	12	13	662	432	9	6	447
Eelpout	9	1		10	14			14				
Pike	2 712	5 068	7	7 787	3 074	5 374	1	8 449	2 791	5 017		7 808
Gibel carp	4 371	12 732	13	17 115	7 175	17 744	3	24 922	3 965	15 362		19 328
Carp	11	8		19	7	31		38	16	24		40
Ruff	4 404	92	1	4 497	4 408	25		4 433	1 081	148		1 228
Sprat		25		25		21		21		7		7
Pikeperch	12	120		132	44	84		128	12	127		139
Bream	212	206		418	168	76		244	84	109		193
Flounder	1 775	6 892		8 667	1 953	6 405		8 358	2 321	7 892	1	10 215
Tench	1 779	40		1 819	1 678	4		1 682	1 143	608		1 751
Burbot	533	720		1 253	279	224		503	178	318		496
Salmon	16	84		100	21	86		106	8	124		132
Sea trout		313		313	36	176		212	37	258		295
Whitefish	61	3 166		3 227	59	1 939		1 998	49	1 870	10	1 930
Smelt	1 042	15		1 057	468	29		497	279	26		305
Silver bream	2 333	7 116		9 449	2 786	6 102		8 888	1 493	6 616		8 109
Stickleback	213			213	8			8				
Rudd	1 744	244		1 988	1 275	90		1 365	484	507		991
Herring	40 465	2 431		42 896	33 579	4 612		38 191	216 230	3 322		219 552
Ide	2 733	3 976	38	6 747	3 178	3 509	9	6 696	2 358	3 080	3	5 440
Roach	7 480	7 155	5	14 639	6 826	6 953	2	13 781	6 215	7 492	2	13 709
Dace						3		3				
European chub						15		15		20		20
Cod	1	5		6		7		7	3	39		42
Garfish	38 141	339	90	38 570	20 668	615	71	21 353	19 297	1 152	36	20 485
Bleak	50	66		116	35	20		55	31			31
Rainbow trout	2	8		10					4	2		6
Vimba bream	279	977		1 255	289	538		827	713	1 225		1 938
Twaite shad												
Round goby												
Total	**112 832**	**70 614**	**213**	**183 659**	**90 693**	**64 244**	**124**	**155 061**	**261 741**	**67 391**	**72**	**329 204**

Source: MoA

	2010				2011				2012				
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	2007–2012 Average
	3 737	19 847	72	23 655	2 234	14 969	9	17 212	7 458	25 041	22	32 521	20 040
	380		5	384	264	26	3	293	169	2		171	436
	19			19					2			2	8
	4 463	7 770	18	12 251	5 069	14 125		19 194	6 865	17 323		24 188	13 279
	4 571	17 419	1	21 990	3 983	19 856	5	23 844	5 802	19 808		25 610	22 135
	22	2		24		1		1	17	6		23	24
	712	88	11	811	1 269	200		1 469	3 847	147	1	3 994	2 739
	50	18		68		11		11		2		2	22
	127	262		388	99	378		477	80	314	1	395	276
	110	206		316	409	385		794	426	57		483	408
	2 412	8 827	21	11 260	1 352	7 453		8 805	2 732	6 329	1	9 063	9 394
	1 075	207		1 282	1 272	198		1 470	2 118	204		2 321	1 721
	94	331		424	153	194		347	412	468		880	651
	31	90		121		56		56	40	176		216	122
	2	244		246	17	419		436	45	689		734	373
	70	1 339		1 408	30	1 981		2 011	31	2 683		2 714	2 215
	129	38		167	27	9		36	77	4		81	357
	1 550	6 254		7 804	1 043	9 078		10 121	1 662	13 236	4	14 902	9 879
													37
	498	416		914	1 006	737		1 743	306	593		899	1 317
	228 994	2 430	8	231 432	178 818	2 885		181 703	139 637	2 998		142 635	142 735
	1 702	1 520	18	3 241	1 007	1 261		2 268	775	1 327	5	2 107	4 416
	5 915	7 774	10	13 699	7 692	11 342		19 034	6 881	12 477	1	19 359	15 704
													1
													6
	5	51		56	12	47		59	12	43	3	58	38
	19 292	246	63	19 601	30 303	691	10	31 004	8 246	379	80	8 705	23 286
	33			33	27			27	131	51		182	74
						8		8					4
	778	2 285		3 063	754	3 024		3 778	725	3 196		3 921	2 464
						1		1					0
										13		13	2
	276 767	**77 663**	**226**	**354 656**	**236 839**	**89 335**	**27**	**326 201**	**188 493**	**107 565**	**118**	**296 175**	**274 159**

Table 11. Species composition and catches (kg) of commercial fishing in Gulf of Riga (ICES subdivision 28.1, except Pärnu Bay) by coastal fishing gear, 2007–2012

Species	2007					2008					2009				
	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total
Perch	10 004	195 535		4 835	210 374	10 326	171 554		1 595	183 475	7 117	205 629		1 193	213 939
Eel	2 027	1		15	2 044	1 690	4		8	1 703	1 440	15		4	1 459
Eelpout	8		65		73	27		65		92	29				29
Pike	873	1 393			2 266	1 369	1 505			2 874	1 585	957			2 542
Gibel carp	1 538	7 572		4	9 113	1 898	7 289			9 187	2 023	2 845			4 868
Lamprey												2			2
Carp		141		3	144	9	21			30	7	10			17
Ruff	196	4 082			4 278	1 088	5 623		10	6 721	267	10 870			11 137
Sprat		42			42							8			8
Crucian carp											409	5 703			6 112
Pikeperch	32	1 908		22	1 962	35	1 543		7	1 585	207	465		2	673
Bream	4	18			22	19	186			205	13	62			75
Flounder	14 642	5 583	128	12	20 365	13 957	6 255		10	20 222	8 974	4 076		26	13 076
Tench	47	41			88	246	46			292	304	191			494
Burbot	454	57			511	157	7			164	155	4			159
Salmon	63	547			609	85	368			453	70	541			611
Sea trout	41	358			399	130	475			605	144	544			688
Four-horned sculpin							1			1		1			1
Whitefish	19	2 092			2 111	20	2 122			2 142	13	3 602			3 615
Sea lamprey	1				1										
Smelt	567	206			773	1 000	413			1 413	5 308	116			5 424
Lumpfish							1			1					
Silver bream	38	385		6	429	273	99		8	380	153	43		22	218
Stickleback						9				9	40				40
Rudd	46	52			98	21				21					
Herring	1 161 643	12 706			1 174 349	1 623 106	13 225			1 636 331	1 357 088	3 681			1 360 769
Ide	59	228		2	289	126	166			292	129	288			417
Roach	12 745	8 521		28	21 293	11 722	6 642		8	18 372	10 868	6 273	6 700	16	23 857
Dace		12			12										
Cod	116	47			163	345	157			502	210	115			324
Garfish	26 405	304			26 709	37 305	2 401		15	39 721	22 338	164		25	22 527
Bleak	12				12	6				6	28	10			38
Rainbow trout	1	11			12	3	11			14	3	3			6
Vimba bream	164	4 062		42	4 267	151	2 962			3 113	188	2 833			3 021
Twaite shad	1				1										
Round goby												0			0
Total	**1 231 743**	**245 900**	**193**	**4 969**	**1 482 806**	**1 705 121**	**223 075**	**65**	**1 661**	**1 929 922**	**1 419 106**	**249 049**	**6 700**	**1 288**	**1 676 143**

Source: MoA

	2010					2011					2012					
	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	2007–2012 Average
	7 175	180 483		136	187 794	25 668	140 799		18	166 484	17 964	129 080	15	1 024	148 083	185 025
	1 219	1		10	1 230	795	2			797	600			3	603	1 306
	2				2	29	1			30	2				2	38
	3 027	1 784			4 811	3 695	2 740			6 434	2 856	3 572		26	6 454	4 230
	2 605	2 287			4 891	2 561	5 512			8 072	2 860	6 011		55	8 925	7 510
	4				4						10				10	3
		6			6	1	8			9						34
	242	10 093			10 335	199	7 277			7 476	3 738	4 236	2		7 976	7 987
	50	30			80		10			10		105			105	41
	399	3 315			3 714	64	752			816	224	1 167			1 391	2 005
	61	950			1 011	190	4 027			4 217	53	2 504		43	2 600	2 008
	25	24			49	128	86			214	157	93			250	136
	7 861	5 280	4 050	5	17 195	8 931	4 575	1 773		15 279	8 647	3 012	720	24	12 403	16 423
	501	260			761	1 042	61			1 103	373	528			901	606
	143	29			171	217	13			230	192	24			216	242
	63	678			741	53	467			520	48	748			796	622
	63	721			784	98	645			743	153	983			1 136	726
							12			12		1			1	3
	5	1 281			1 286	53	900			953	20	1 605			1 625	1 955
																0
	1 011	87			1 098	529	25			554	376	20			396	1 609
																0
	227	205		7	439	235	233		15	483	114	307			421	395
						42				42						15
																20
	1 555 136	15 626			1 570 761	1 307 801	18 640			1 326 441	752 869	40 490			793 359	1 310 335
	110	109			219	45	44			89	10	34			44	225
	15 219	4 926	11 400	7	31 552	15 661	10 258		15	25 933	12 834	13 647		19	26 501	24 585
	2				2		1			1						3
	220	171			391	118	154			272	193	250			443	349
	23 763	122		122	24 007	21 102	106			21 208	8 725	152		5	8 882	23 842
											21				21	13
							11			11						7
	148	3 040			3 188	131	2 845			2 976	147	3 440			3 587	3 358
																0
											87	1			88	15
	1 619 278	**231 506**	**15 450**	**287**	**1 866 521**	**1 389 386**	**200 200**	**1 773**	**48**	**1 591 407**	**813 272**	**212 008**	**737**	**1 199**	**1 027 216**	**1 595 669**

Table 12. Species composition and catches (kg) of commercial fishing in Pärnu Bay (fishing squares 178–180) by coastal fishing gear, 2007–2012

Species	2007				2008					2009				
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total
Perch	232 627	269 814	3 743	506 184	243 774	184 705		712	429 190	228 052	277 703	2	159	505 916
Eel	184	2	12	198	144			4	148	115				115
Eelpout	4			4	60				60	44	3			47
Pike	260	270		531	486	950			1 436	338	129			466
Chinese mitten crab						1			1					
Gibel carp	17 334	5 870	14	23 218	11 239	7 337			18 576		8			8
Lamprey	505			505	17				17	148				148
Carp	12	45	3	60	27	245			272	10	124			134
Ruff	6 125	1 842		7 967	7 143	1 567		5	8 715	8 719	3 706			12 425
Crucian carp										5 404	7 818		5	13 227
Pikeperch	38 185	56 446	35	94 666	41 849	9 089		146	51 084	40 415	24 511		4	64 931
Bream	4 966	643		5 609	3 336	404			3 740	2 102	309			2 411
Flounder	640	685	2	1 327	691	494	1	1	1 186	1 202	581			1 783
Tench					3	10			13	1	13			14
Burbot	16	7		23	6	2			8	13				13
Salmon	14	4		18	32	109			141	44	32			76
Sea trout	5	3		8	2	6			8	20				20
Four-horned sculpin						1			1					
Whitefish	97	993		1 090	63	328			391	96	631			727
Sea lamprey														
Smelt	457 234	6 351		463 585	624 103	1 558			625 661	717 895	25 675			743 569
Silver bream	25 593	2 422		28 015	20 207	2 855	12	7	23 081	11 265	2 302	4		13 570
Stickleback														
Rudd	3			3						7				7
Herring	4 627 326	229		4 627 555	8 338 808	277			8 339 085	9 030 925	43			9 030 968
Ide	42	6		48	2	6			8		5			5
Roach	16 559	2 339	2	18 900	9 621	1 387		9	11 017	9 018	1 682			10 700
Dace														
Cod	1			1	9				9		3			3
Garfish	18 188	120		18 308	10 090	100			10 190	14 689	115			14 804
Bleak					10				10					
Vimba bream	20 190	5 612		25 801	20 644	4 570			25 214	11 182	5 223			16 405
Lesser sand eel							80		80					
Total	**5 466 109**	**353 702**	**3 811**	**5 823 622**	**9 332 365**	**215 998**	**93**	**884**	**9 549 339**	**10 081 700**	**350 615**	**6**	**168**	**10 432 489**

Source: MoA

2010					2011					2012					
Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	2007–2012 Average
301 034	312 067	19	228	613 348	391 777	172 031	31	479	564 317	185 925	151 691		1 291	338 907	492 977
72			2	74	84	2			86	108			20	128	125
762	3			765	50				50	366	6			372	216
1 035	667			1 702	1 185	537			1 722	584	473			1 057	1 152
															0
					2 163	5 969			8 131	9 539	4 383			13 922	10 642
567				567	868	3			871	348	1			349	409
11	82			93	11	35			46	16	62			78	114
12 218	8 933			21 151	41 184	10 398			51 582	34 744	4 111			38 855	23 449
4 724	8 810			13 534	3 781	865			4 646	3 607	1 917		350	5 874	6 213
34 119	36 739		82	70 941	48 233	52 699	135	133	101 200	36 289	104 794		2 057	143 140	87 660
2 031	260			2 291	5 240	324			5 564	9 091	359			9 450	4 844
898	689			1 587	887	304			1 191	1 024	188		20	1 232	1 384
2	36			38	45	12			57	8				8	22
19	2			21	19				19	34	2			36	20
29	30			59	102	32			134	311	11			322	125
13				13	3				3	101	31			132	31
															0
36	817			853	53	731			784	656	1 397			2 053	983
31				31											5
404 780	1 428			406 208	115 864	257			116 121	285 340	381			285 721	440 144
10 397	2 474	3		12 874	9 795	1 615			11 410	16 335	868		12	17 215	17 694
11		5		16											3
															2
6 328 126	246			6 328 372	6 282 647	110			6 282 757	5 444 736	140			5 444 876	6 675 602
6	2			8											11
10 544	2 131			12 675	23 662	3 695			27 356	21 544	1 998		14	23 556	17 367
					20	1			21						4
12	3			15	3	7			10	2	7			9	8
21 168	20			21 188	49 137	212			49 349	11	116			127	18 994
															2
16 606	5 338			21 944	32 022	9 905			41 927	31 737	12 731			44 468	29 293
							52		52			192		192	54
7 149 251	**380 777**	**27**	**311**	**7 530 366**	**7 008 832**	**259 744**	**218**	**612**	**7 269 403**	**6 082 456**	**285 665**	**192**	**3 764**	**6 372 076**	**7 829 549**

TRAWL FISHERY IN THE BALTIC SEA

Stocks and catches of herring, sprat and cod, and future outlooks

Herring, sprat and cod are internationally regulated fish species regarding which the International Council for the Exploration of the Sea (ICES) issues annual stock assessments and management recommendations for different fishing grounds and stock units.

Herring

Herring *(Clupea harengus membras)* is a subspecies of Atlantic herring that inhabits the whole of the Baltic Sea, forming local populations. Based on the time of spawning, a distinction is made between spring-spawning herring, which spawns from March to June, and autumn-spawning herring, which spawns in August and September and whose proportion has been less than 5% since 1970 in all areas. In recent years, however, the share of autumn-spawning herring has increased e.g. on the south coast of the island of Saaremaa.

It needs to be clarified, however, whether this is actually autumn-spawning herring or rather spring-spawning herring whose spawning has been postponed to autumn for some reason.

Since 2009, herring and sprat stocks have been assessed in accordance with the methodology of the ICES, while biological material is collected under EU Council Regulation (EC) No 199/2008, Commission Regulation (EC) No 949/2008 and Commission Decision 949/2008/EC.

In the case of herring the state of stocks is assessed and advice for exploitation is given separately for four stock units (Figure 6):

- Central Baltic herring (subdivisions 25–29 and 32);
- Gulf of Riga herring (subdivision 28.1);
- Bothnian Sea herring (subdivision 30); and
- Bothnian Bay herring (subdivision 31).

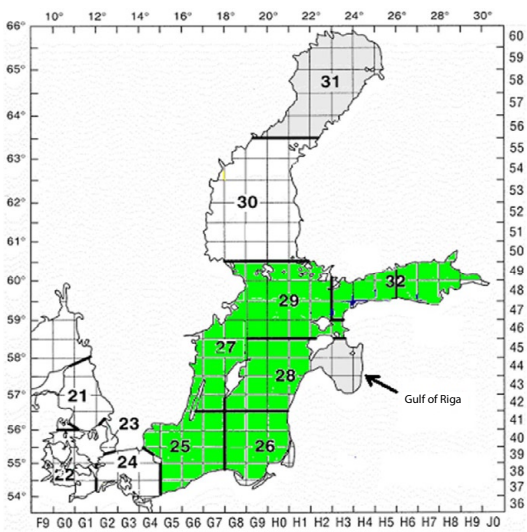


Figure 6.
Agreed stock and management units for herring in Baltic Sea:
- Central Baltic herring, also referred to as open sea herring (ICES subdivisions 25–29 and 32; green in figure),
- Gulf of Riga herring (subdivision 28.1),
- Bothnian Sea herring (subdivision 30),
- Bothnian Bay herring (subdivision 31).

Source: ICES 2012

The Gulf of Riga and the Bothnian Sea (and possibly also Bothnian Bay) are inhabited by local natural herring populations. Central Baltic herring comprises different populations (e.g. Gulf of Finland herring and Swedish coast herring).

The following overview discusses primarily the first two stock units, as these are of more interest to Estonian fishermen.

Central Baltic herring

In recent years, herring catches from the Baltic Proper have increased – from a low of 92,000 tonnes during the recession in 2005 to 137,000 tonnes in 2010. The total allowable catch (TAC) for 2012 was reduced and the herring catch amounted to around 101,000 tonnes.

Table 13. Herring in subdivisions 25–29 and 32: catches by country (10^3 t), 1977–2012

Year	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
1977	11.9		33.7	0.0			57.2	112.8	48.7	**264.3**
1978	13.9		38.3	0.1			61.3	113.9	55.4	**282.9**
1979	19.4		40.4	0.0			70.4	101.0	71.3	**302.5**
1980	10.6		44.0	0.0			58.3	103.0	72.5	**288.4**
1981	14.1		42.5	1.0			51.2	93.4	72.9	**275.1**
1982	15.3		47.5	1.3			63.0	86.4	83.8	**297.3**
1983	10.5		59.1	1.0			67.1	69.1	78.6	**285.4**
1984	6.5		54.1	0.0			65.8	89.8	56.9	**273.1**
1985	7.6		54.2	0.0			72.8	95.2	42.5	**272.3**
1986	3.9		49.4	0.0			67.8	98.8	29.7	**249.6**
1987	4.2		50.4	0.0			55.5	100.9	25.4	**236.4**
1988	10.8		58.1	0.0			57.2	106.0	33.4	**265.5**
1989	7.3		50.0	0.0			51.8	105.0	55.4	**269.5**
1990	4.6		26.9	0.0			52.3	101.3	44.2	**229.3**
1991	6.8	27.0	18.1	0.0	20.7	6.5	47.1	31.9	36.5	**194.6**
1992	8.1	22.3	30.0	0.0	12.5	4.6	39.2	29.5	43.0	**189.2**
1993	8.9	25.4	32.3	0.0	9.6	3.0	41.1	21.6	66.4	**208.3**
1994	11.3	26.3	38.2	3.7	9.8	4.9	46.1	16.7	61.6	**218.6**
1995	11.4	30.7	31.4	0.0	9.3	3.6	38.7	17.0	47.2	**189.3**
1996	12.1	35.9	31.5	0.0	11.6	4.2	30.7	14.6	25.9	**166.7**
1997	9.4	42.6	23.7	0.0	10.1	3.3	26.2	12.5	44.1	**172.0**
1998	13.9	34.0	24.8	0.0	10.0	2.4	19.3	10.5	71.0	**185.9**
1999	6.2	35.4	17.9	0.0	8.3	1.3	18.1	12.7	48.9	**148.7**
2000	15.8	30.1	23.3	0.0	6.7	1.1	23.1	14.8	60.2	**175.1**
2001	15.8	27.4	26.1	0.0	5.2	1.6	28.4	15.8	29.8	**150.2**
2002	4.6	21.0	25.7	0.3	3.9	1.5	28.5	14.2	29.4	**129.1**
2003	5.3	13.3	14.7	3.9	3.1	2.1	26.3	13.4	31.8	**113.8**
2004	0.2	10.9	14.5	4.3	2.7	1.8	22.8	6.5	29.3	**93.0**
2005	3.1	10.8	6.4	3.7	2.0	0.7	18.5	7.0	39.4	**91.6**
2006	0.1	13.4	9.6	3.2	3.0	1.2	16.8	7.6	55.3	**110.4**
2007	1.4	14.0	13.9	1.7	3.2	3.5	19.8	8.8	49.9	**116.0**
2008	1.2	21.6	19.1	3.4	3.5	1.7	13.3	8.6	53.7	**126.2**
2009	1.5	19.9	23.3	1.3	4.1	3.6	18.4	12	50.2	**134.1**
2010	5.4	17.9	21.6	2.2	3.9	1.5	25.0	9.1	50.0	**136.7**
2011	1.8	14.9	19.2	2.7	3.4	2.0	28.0	8.5	36.2	**116.8**
2012*	**1.4**	**11.4**	**18.0**	**0.9**	**2.6**	**1.8**	**25.5**	**13.0**	**26.2**	**100.9**

* Data for 2012 are preliminary and subject to change.

Source: ICES 2013

The average catch of herring taken in this area in recent years represents just 45% of the average herring catch of the 1980s. As in previous years, Sweden (27%), Poland (26%) and Finland (18%) landed the largest catches in 2012. Estonia's catch was 11,400 tonnes, which accounted for 12% of the total catch (Table 13). In terms of weight, the most herring was caught in subdivisions 25–26, 28.2 and 29, while subdivisions 29 and 32 dominated in terms of numbers. This can be explained by geographical differences in the mean body weight of herring (Figure 7).

The average age composition of herring catches has been relatively similar over time: catches are dominated by age groups 1–3, which represent nearly 60% of catches. This can be explained by the domination of pelagic cohorts mainly composed of younger herring in trawl catches (Figure 8). Unlike sprat, greater

Figure 7.
Herring in subdivisions 25–29 and 32: proportion of catch in weight and numbers by subdivision in 2012
Source: ICES 2013

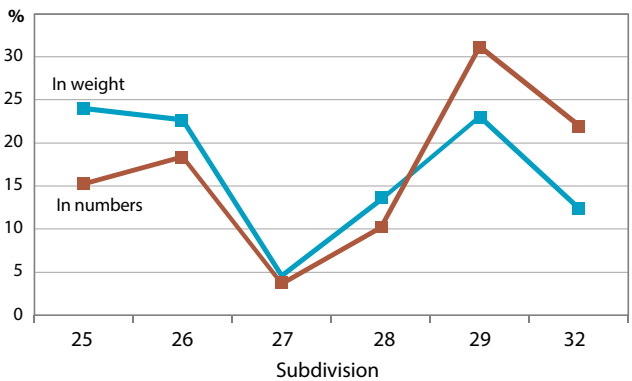


Figure 8.
Herring in subdivisions 25–29 and 32: average age composition of catches, 1974–2012
1: age 1
2: age 2, etc.
6+: age 6 and older
Source: ICES 2013

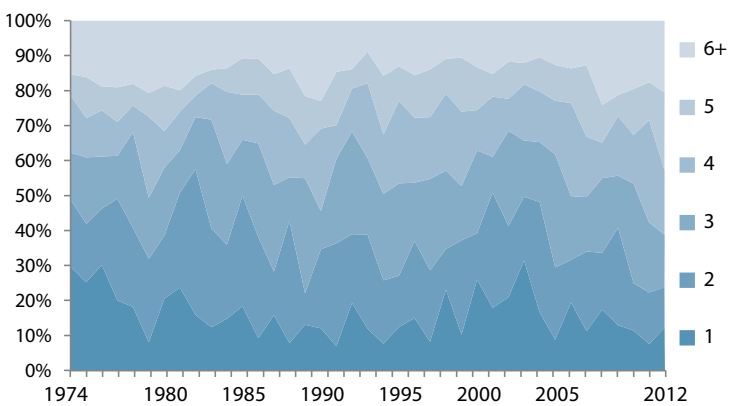
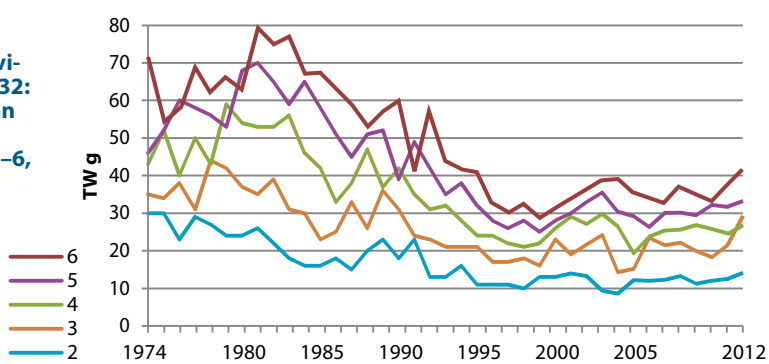


Figure 9.
Herring in subdivisions 25–29 and 32: dynamics of mean body weight of herring at ages 2–6, 1974–2012
Source: ICES 2013



stability of age composition has been observed in herring catches, which is due to a smaller variation in the strength of herring year classes.

The mean body weight of herring has decreased considerably over the past 20–25 years throughout the Baltic Sea, accounting for just 40–50% of the weight level of the 1970s and 1980s in the age groups that are more abundant today. The mean body weight of age groups has stabilised at a low level since the period 2006–2008. However, an increase in body weight has been observed in key age groups over the last few years (Figure 9).

According to the latest estimate, at the beginning of 2013 the spawning stock biomass of herring in the Baltic Proper amounted to 751,000 tonnes or 81% of the 1974–2011 average (Figure 10). This relatively low SSB is explained by poor individual growth, as well as by a lower abundance of recent year classes compared to earlier times. Namely, there have been no abundant herring year classes since 1985. From 1986 to today, just six year classes were observed whose abundance considerably exceeded the long-term average, with the most recent such year classes being these of 2007 and 2011 (Figure 11). Therefore, in recent years the stocks have increased mainly as a result of the decline in fishing mortality. The outlook for the coming years depends on the abundance of cohorts of 2009–2013, which will account for most of the catch in the period 2013–2015, when they will be 2–6 years of age.

The stock status of Central Baltic herring is assessed against two reference levels of fishing mortality whose values the ICES altered in 2013. These values

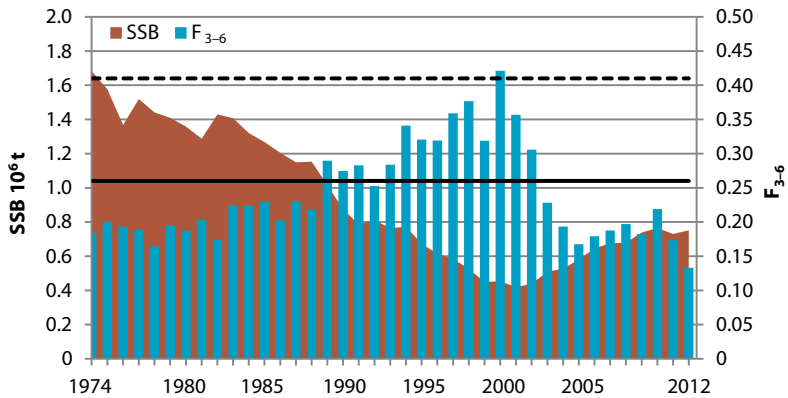


Figure 10. Herring in subdivisions 25–29 and 32: spawning stock biomass (SSB) and fishing mortality in age groups 3–6 ($F_{3–6}$), 1974–2012
The horizontal line represents the level of F_{MSY} = 0.26 and the dotted line indicates the sustainable mortality rate F_{PA} = 0.41. Source: ICES 2013

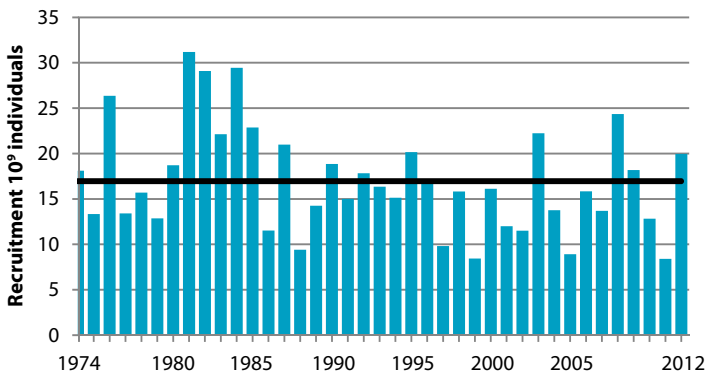


Figure 11. Herring in subdivisions 25–29 and 32: dynamics of abundance of recruitment (at age 1), 1974–2012
The horizontal line marks the long-term average.
Source: ICES 2013

are as follows:

1) precautionary fishing mortality rate FPA = 0.41: the maximum fishing mortality rate that can be implemented without directly endangering stock reproduction potential, but which should be avoided in accordance with responsible fishing principles; and

2) maximum fishing mortality for sustainable yield F_{MSY} = 0.26: enables maximum catches to be taken in the long run without endangering stocks.

In the past, the ICES had set the F_{MSY} level at 0.19. Actual fishing mortality has been lower than that level since 2003: the values for the years from 2010–2012 were 0.18, 0.16 and 0.13, respectively. Looking at herring fishing mortality in the Baltic Proper since 1974, there appears to be a period of particularly high mortality (the period 1994–2002) when the actual mortality rate significantly exceeded the recommended level (Figure 5).

According to the ICES advice, which is based on the maximum sustainable yield approach, the fishing mortality rate of Central Baltic herring should not exceed F_{MSY} = 0.26 in 2014. This mortality rate translates to catches of up to 164,000 tonnes. For the sake of comparison: for 2013 the ICES advised that catches should not exceed 117,000 tonnes; the EU TAC2013 was 90,000 tonnes.

The European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF) states in its report that the advice of the ICES pertains to herring stocks in the Baltic Proper. Since catches taken in the Baltic Proper also contain some herring from the Gulf of Riga, and some Central Baltic herring is caught in the Gulf of Riga, the catches of Central Baltic herring taken in the Gulf of Riga should be excluded and the gulf herring caught in the Baltic Proper should be included in the advice of the ICES. Therefore, the STECF suggests that under the MSY approach the total allowable catch of herring in subdivisions 25–29 and 32 in 2014 should be no more than 159,080 tonnes, which is 63% more than actually caught in 2012 (Casey *et al.* 2013).

Gulf of Riga herring

Gulf of Riga herring are only caught by Estonian and Latvian fishermen. The proportion of Latvia's catches has been 60–70% in the last couple of decades. According to Latvian researchers, a significant part of Latvian herring catches was not reflected in official statistics until 2010. In recent years this proportion has been estimated to be up to 10% of the official catch, and previously even up to 20%.

All the herring caught by Latvian fishermen are presumed to have been included in the official statistics of Latvia since 2011 (Table 14).

In addition to local gulf herring, catches also include Central Baltic herring spawns in the Gulf of Riga. Both varieties come under a single catch quota. The proportion of Central Baltic herring in the total herring catch taken from the Gulf of Riga has been less than 5% in recent years.

The long-term age structure of herring catches from the Gulf of Riga is generally similar to that of Central Baltic herring catches. The only difference is the greater variation in the abundance of the Gulf of Riga year classes, especially since the 1990s (Figure 12).

Similar to Central Baltic herring, the mean body weight of different age groups of herring caught in the Gulf of Riga has decreased significantly com-

Table 14. Gulf of Riga herring: Estonian, Latvian and unreported landings (t), 1991–2012

Year	Estonia	Latvia	Unreported (Latvia)	Total
1991	7 420	13 481	–	20 901
1992	9 742	14 204	–	23 946
1993	9 537	13 554	3 446	26 537
1994	9 636	14 050	3 512	27 198
1995	16 008	17 016	3 401	36 425
1996	11 788	17 362	3 473	32 623
1997	15 819	21 116	4 223	41 158
1998	11 313	16 125	3 225	30 663
1999	10 245	20 511	3 077	33 833
2000	12 514	21 624	3 244	37 382
2001	14 311	22 775	3 416	40 502
2002	16 962	22 441	3 366	42 769
2003	19 647	21 780	3 267	44 694
2004	18 218	20 903	3 136	42 257
2005	11 213	19 741	2 961	33 915
2006	11 924	19 186	2 878	33 988
2007	12 764	19 425	2 914	35 103
2008	15 877	19 290	1 929	37 096
2009	17 167	19 069	1 907	38 143
2010	15 422	17 751	1 775	34 948
2011	14 721	20 203	–	35 024
2012	**13 789**	**17 944**	**–**	**31 733**

Source: ICES 2013

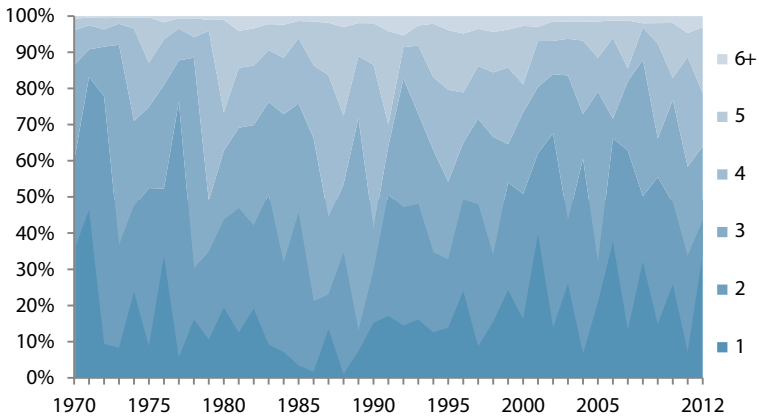


Figure 12. Gulf of Riga herring: average age composition of catches, 1974–2012
Source: ICES 2013

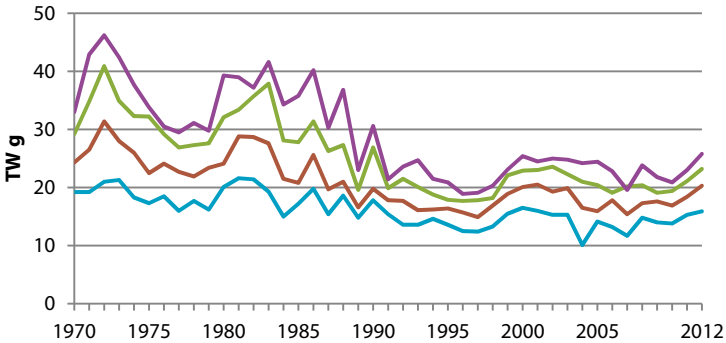


Figure 13. Gulf of Riga herring: dynamics of mean body weight of herring aged 2–5, 1970–2012
Source: ICES 2013

pared to the 1980s. A relatively significant change in body weight could also be observed during the 1990s and 2000s. During the last three years the body weight has increased in key age groups (Figure 13).

The spawning stock biomass of Gulf of Riga herring is up to twice the level of the 1970s (Figure 14). The good condition of the stock is mostly due to the abundance of year classes 1996–2006, which has been high, unlike in the Baltic Proper. Only the abundance of the cohorts that appeared after the cold winters of 1996, 2003 and 2006 was equal to or below the long-term average in the Gulf of Riga (Figure 15). The year-class strength of herring seems to be influenced by the severity of the winter and the abundance of zooplankton in spring which determines the feeding conditions of juveniles in spring and thus their survival. The mild winters in the last decade have apparently been favourable for the reproduction of Gulf of Riga herring. Looking at the abundance of the last four year classes, it appears that the year classes of 2008 and 2009 were close to the long-term average, the year class of 2010 proved weak, and the year class of 2011 exceeded the average abundance (Figure 15).

The spawning stock biomass of herring in the Gulf of Riga decreased slightly from 2004–2006. However, the SSB stabilised thanks to the abundant year classes of 2005 and 2007, exceeding the long-term average by 2.3% at the beginning of 2013, while being 16% lower than in the preceding year (SSB2011 was 94,662 tonnes and SSB2012 was 79,100 tonnes). The dynamics of herring catches in the Gulf of Riga have been similar to that of spawning stock biomass: the catches have ranged from 30,000–40,000 tonnes since the second half of the

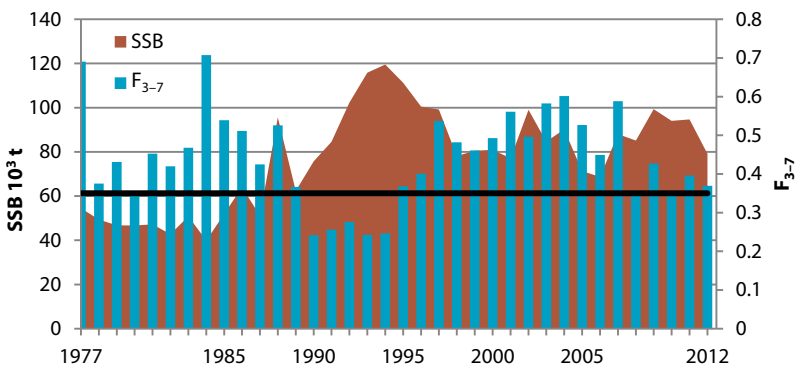


Figure 14.
Gulf of Riga herring: spawning stock biomass (SSB) and fishing mortality in age groups 3–7 (F_{3-7}), 1977–2012
The horizontal line represents the maximum sustainable exploitation intensity F_{MSY} = 0.35.
Source: ICES 2013

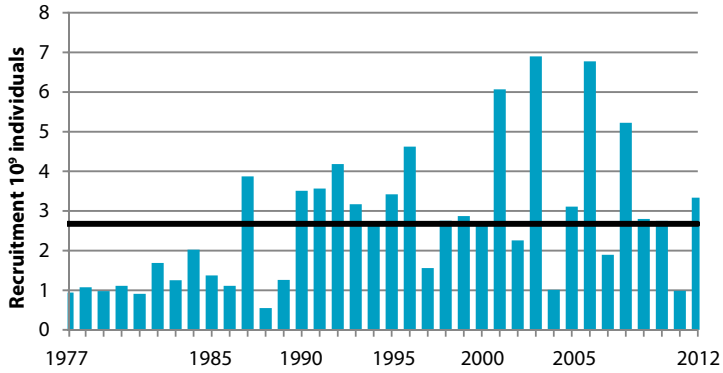


Figure 15.
Gulf of Riga herring: dynamics of abundance of recruitment (age 1), 1977–2012
The horizontal line marks the long-term average.
Source: ICES 2013

1990s, which is two times higher than in the 1970s and 1980s (ICES 2012). It should be remembered that catches of Gulf of Riga herring are limited by the TAC. Although management of the stock has generally been sustainable in the Gulf of Riga in the recent past, the high fishing mortality is a concern. This phenomenon can probably be explained by both body weight dynamics and the fact that some landings are not reported (it is estimated that 10–20% of Latvia's landings remained unreported in previous years, Table 14).

The status of Gulf of Riga herring stock is assessed against the two reference levels of fishing mortality mentioned above. According to the current estimations, the sustainable fishing mortality FPA is 0.4 and the maximum sustainable yield fishing mortality F_{MSY} is 0.35 for Gulf of Riga herring.

Based on the ICES advice, which is based on the maximum sustainable yield approach, the fishing mortality rate of Gulf of Riga herring for 2014 should not exceed the level of F_{MSY} of 0.35. This implies that the total catch of Estonia and Latvia should not exceed 25,800 tonnes. (For 2013 the ICES advised a catch of up to 23,200 tonnes.) The advice of the ICES only concerns gulf herring. The STECF suggests that the catches of open sea herring likely to be caught in the Gulf of Riga should be included and the catches of gulf herring taken outside of the Gulf of Riga should be excluded; thus the TAC of herring taken from the Gulf of Riga in 2014 should be 30,720 tonnes (TAC2013 = 30,600 tonnes, Casey *et al.* 2013).

Regrettably, the long-term trend of fishing mortality rates indicates that despite the high biomass of Gulf of Riga herring, fishing mortality has exceeded the levels mentioned above since 1997 (Figure 10). The state of Central Baltic herring stocks may improve if sprat stocks decrease, as this would reduce food competition between sprat and herring and lead to an increase in the mean body weight of herring. However, this development is less likely in the case of Gulf of Riga herring, as the abundance of sprat is low in the Gulf of Riga. Nevertheless, the increasing body weight of Gulf of Riga herring in recent years allows for an optimistic outlook of the future of this stock unit. The increasing body weight can be expected to cause a much faster reduction in the fishing mortality of both stock units, which in turn would create preconditions for increased fishing opportunities.

Comparison of trawl and coastal fishery herring catches

Trawling accounted for 66% and fixed gear produced 34% of the Estonian herring catch for 2012. The Gulf of Riga and the Gulf of Finland are the most important trawling areas within the economic zone of Estonia. Since the herring stocks of the Baltic Proper have been depressed for a long time, herring is mostly caught there as by-catch in sprat trawling.

Most of Estonia's herring is caught in the second quarter. Trawling catches are highest in April, particularly in the Gulf of Riga. At this time, herring shoals heading for their spawning grounds in coastal waters are tighter and thus a good target for fishing vessels. Although a prohibition on trawling is applied each spring to protect migrating spawners, Estonian fishing vessels are still able to catch spawning stock in the Gulf of Riga for a relatively short period of time. The prohibition on trawling is applied in the Gulf of Riga each year for a month (April–May) and the start date of the prohibition is determined each year based

on the hydro-meteorological conditions affecting the movement of spawning stock. While Estonia and Latvia have the capacity to decide on the start date of the prohibition, they have not been able to agree on establishing the prohibition for exactly the same period.

Looking at the herring catches of Latvia and Estonia in the Gulf of Riga, it appears that in Estonia almost a third of the annual catch is taken in coastal waters with fixed gear, while trawling prevails in Latvia. This is due to a fairly obvious reason: fixed gear enables fishing in the area of coastal spawning grounds which, in the Gulf of Riga, are located primarily off the coast of Estonia. Hence the interest of Latvian fishers to impose the prohibition on trawling as late as possible to provide their trawlers with good fishing opportunities. In most cases, the prohibition on trawling takes effect in the economic zone of Estonia much sooner than in Latvia's zone, but on account of the above the interests of Estonia trawlers are also taken into account. Winters during which the Gulf of Riga is covered with ice for several months are not rare. When this is the case, trawling is only possible during a few weeks in the first half of the year, in late March and April.

Trawling and fixed gear fishery have a different impact on herring stocks even if catches are of the same quantity.

- In trawling, more fish are taken out of the stock, because the average individual weight of the fish caught is lower than in the case of fishing with fixed gear during spawning. In 2012, the average individual weight of herring caught in trawling in the Gulf of Riga was 21.8 g and that of herring caught in fishing with fixed gear was 29.6 g.
- Trawl catches include both mature fish and juveniles, while herring juveniles are almost non-existent in catches taken with fixed gear.

However, fixed gear fishery, which is purely based on spawning stock, has its own risks. These risks should be taken into account when determining or changing the proportions of the two fishing modes in question.

During trawling in autumn 2012, especially in November and December, problems with the by-catch of other species, in particular smelt juveniles, appeared in the Gulf of Riga.

The sample taken of a trawling catch of a trawler in early December contained an estimated amount of 57,931 young smelts born in the summer of the same year and weighing 2.9 g on average. Several other trawlers fishing in the same area had similar trawling catches.

During extra-long trawling sessions, which last for up to 16 hours in the Gulf of Riga, it is not possible to avoid situations where the composition of the catch becomes inappropriate both for fishers and in terms of reasonable management of fish stocks.

In the Baltic Proper the proportions of sprat and herring in the catch cause concerns in some cases, especially when fishing is started in a new area for which there is no information on the composition of the catch.

The length limit of herring (prohibition on selling herring longer than 17 cm for human consumption) causes problems mostly for fishers who use fixed gear. In spring, herring that are longer than permitted are usually present in the catch at the beginning of the fishing period. These originate from other regions of the Baltic Sea and are thus regarded as open sea herring. In 2012 the proportion of herring longer than 17 cm did not exceed 5% in fixed gear fishery in Pärnu County.

This figure reached 37% on the south coast of Saaremaa and 27% in the fixed gear used in the Väinameri Sea, but it may have been close to 60% in the coastal sea in Pärnu County and even 90% near Saaremaa and Muhu Islands and in the Väinameri Sea in a few individual catches at the beginning of the fishing period. In autumn, the length of the vast majority of herring spawning in the coastal waters of Kihnu and Saaremaa exceeds the maximum permitted length of 17 cm.

Sprat

Sprat *(Sprattus sprattus balticus)* is a pelagic fish, like herring. The main biological difference lies in the high fecundity and pelagic spawning of sprat (sprat roe develops while floating in water, whereas herring mostly spawns on benthic veg-

Table 15. Sprat catches in Baltic Sea by country (10^3 t), 1977–2012

Year	Denmark	Estonia	Finland	GDR	FRG	Latvia	Lithuania	Poland	Sweden	Russia*	Total
1977	7.2		6.7	17.2	0.8			38.8	0.4	109.7	**180.8**
1978	10.8		6.1	13.7	0.8			24.7	0.8	75.5	**132.4**
1979	5.5		7.1	4.0	0.7			12.4	2.2	45.1	**77.0**
1980	4.7		6.2	0.1	0.5			12.7	2.8	31.4	**58.4**
1981	8.4		6.0	0.1	0.6			8.9	1.6	23.9	**49.5**
1982	6.7		4.5	1.0	0.6			14.2	2.8	18.9	**48.7**
1983	6.2		3.4	2.7	0.6			7.1	3.6	13.7	**37.3**
1984	3.2		2.4	2.8	0.7			9.3	8.4	25.9	**52.7**
1985	4.1		3.0	2.0	0.9			18.5	7.1	34.0	**69.6**
1986	6.0		3.2	2.5	0.5			23.7	3.5	36.5	**75.9**
1987	2.6		2.8	1.3	1.1			32.0	3.5	44.9	**88.2**
1988	2.0		3.0	1.2	0.3			22.2	7.3	44.2	**80.2**
1989	5.2		2.8	1.2	0.6			18.6	3.5	54.0	**85.9**
1990	0.8		2.7	0.5	0.8			13.3	7.5	60.0	**85.6**
1991	10.0		1.6		0.7			22.5	8.7	59.7	**103.2**
1992	24.3	4.1	1.8		0.6	17.4	3.3	28.3	54.2	8.1	**142.1**
1993	18.4	5.8	1.7		0.6	12.6	3.3	31.8	92.7	11.2	**178.1**
1994	60.6	9.6	1.9		0.3	20.1	2.3	41.2	135.2	17.6	**288.8**
1995	64.1	13.1	5.2		0.2	24.4	2.9	44.2	143.7	14.8	**312.6**
1996	109.1	21.1	17.4		0.2	34.2	10.2	72.4	158.2	18.2	**441.0**
1997	137.4	38.9	24.4		0.4	49.3	4.8	99.9	151.9	22.4	**529.4**
1998	91.8	32.3	25.7		4.6	44.9	4.5	55.1	191.1	20.9	**470.9**
1999	90.2	33.2	18.9		0.2	42.8	2.3	66.3	137.3	31.5	**422.7**
2000	51.5	39.4	20.2		0.0	46.2	1.7	79.2	120.6	30.4	**389.2**
2001	39.7	37.5	15.4		0.8	42.8	3.0	85.8	85.4	32.0	**342.4**
2002	42.0	41.3	17.2		1.0	47.5	2.8	81.2	77.3	32.9	**343.2**
2003	32.0	29.2	9.0		18.0	41.7	2.2	84.1	63.4	28.7	**308.3**
2004	44.3	30.2	16.6		28.5	52.4	1.6	96.7	78.3	25.1	**373.7**
2005	46.5	49.8	17.9		29.0	64.7	8.6	71.4	87.8	29.7	**405.2**
2006	42.1	46.8	19.0		30.8	54.6	7.5	54.3	68.7	28.2	**352.1**
2007	37.6	51.0	24.6		30.8	60.5	20.3	58.7	80.7	24.8	**388.9**
2008	45.9	48.6	24.3		30.4	57.2	18.7	53.3	81.1	21.0	**380.5**
2009	59.7	47.3	23.1		26.3	49.5	18.8	81.9	75.3	25.2	**407.1**
2010	43.6	47.9	24.4		17.8	45.9	9.2	56.7	70.4	25.6	**341.5**
2011	31.4	35.0	15.8		7.7	33.1	9.9	55.3	56.2	19.5	**263.8**
2012	**11.4**	**27.7**	**9.0**		**7.2**	**30.7**	**11.3**	**62.1**	**46.5**	**25.0**	**230.8**

* Until 1991, the Soviet Union.

Source: ICES 2013

etation). Also, sprat is a so-called serial spawner, which means that unlike herring it does not spawn roe all at once, but over a longer period of time. These characteristics cause a remarkable variation in the reproduction of sprat, which depends on the environmental conditions prevailing in different years.

The main spawning grounds of sprat in the Baltic Sea are located on the slopes of the Bornholm and Gotland Deeps, largely overlapping with the spawning grounds of cod. In periods when sprat abundance is high, sprat move out of these reproduction centres, which are characterised by the best environmental conditions, and spread throughout the Baltic Sea, except in freshwater areas in the northern part of Bothnian Bay and the eastern part of the Gulf of Finland. Sprat are also present in the Gulf of Riga in relatively low numbers. The state of sprat stocks is influenced by the abundance of its main natural enemy – the cod. During periods when cod abundance is high, there are few sprat in the Baltic Sea and vice versa. Some researchers believe, however, that sprat may also act as a "predatory fish" for cod, feeding on its pelagic roe. Of course, this situation only occurs on the spawning grounds of cod.

The large variability in the abundance and biomass of sprat is also reflected in the total catch of sprat, which has varied over the last 34 years from just 37,000 tonnes in 1983 to 589,000 tonnes in 1997 (Table 15). From 2007–2011 the catches of Baltic sprat ranged from 264,000 to 407,000 tonnes. The total catch of 2011 was 264,000 tonnes, i.e. 23% less than in 2010. The sprat catch of 2012 was 230,800 tonnes, i.e. in turn 13% less than in 2011. Sweden (20%), Poland (27%), and Latvia (13%) have landed the largest sprat catches in recent years. The decline in the proportion of Denmark from 12% to 5% between 2011 and 2012 is noteworthy. This clearly reflects the depression of sprat stocks in the south-western part of the Baltic Sea.

The stock and age composition of sprat is characterised by the dominance of younger age groups: age groups 1–2 account for up to 80% of catches, depending on the abundance of cohorts (Figure 16).

Changes in the body weight of sprat have generally followed the corresponding trend of herring in recent decades. However, the decline in the body weight of sprat was significantly lower compared to herring in the 1990s, and the mean body weight of sprats of the same age currently amounts to approximately 70% of the figures from the first half of the 1980s. The data for 2012 allow for a more optimistic projection: the mean body weight of sprat aged 2–5 has been increasing in the last few years (Figure 17).

Sprat in the Baltic Sea is treated as a single stock unit and therefore a single total allowable catch (TAC) is specified for sprat which covers the entire Baltic Sea.

Since the second half of the 1980s, in parallel with a decline in the abundance of cod, the abundance and biomass of sprat began to increase rapidly, reaching 3 million tonnes in 1995.

Spawning stock biomass amounted to 1.4 million tonnes. On account of the strong year classes of 1994 and 1995, the spawning stock biomass of sprat reached a record level of 1.7 million tonnes in 1997 and 1998, after which it declined again until 2003. Since 2004 the SSB has ranged from 0.8 to 1.2 million tonnes. At the beginning of 2013 the ICES estimated the SSB of sprat to amount to 905,000 tonnes, which is 6% less than the long-term average (Figure 18).

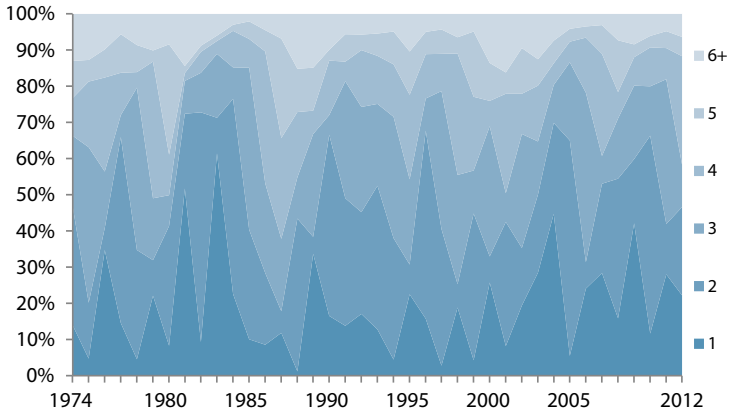


Figure 16.
Average age composition of sprat catches, 1974–2012
1: age 1
2: age 2, etc.
6+: age 6 and older
Source: ICES 2013

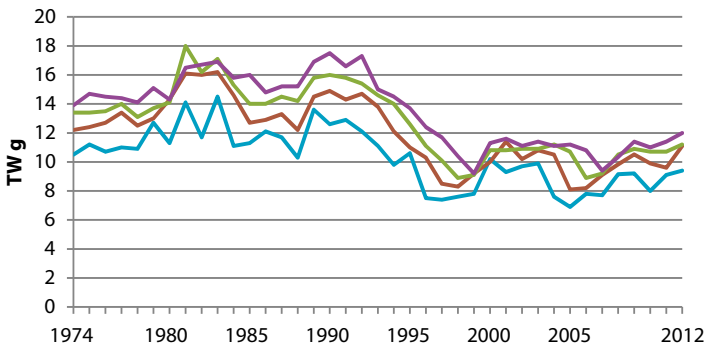


Figure 17.
Dynamics of mean body weight of sprats aged 2–5, 1974–2012
Source: ICES 2013

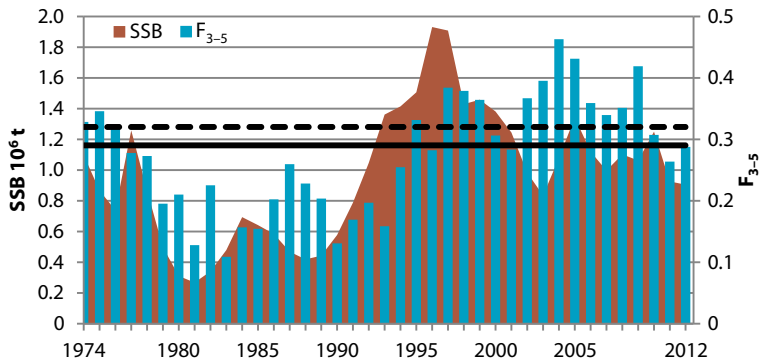


Figure 18.
Sprat spawning stock biomass (SSB) and fishing mortality in age groups 3–5 (F_{3-5}), 1974–2012
The horizontal line represents the level of F_{MSY} = 0.29 and the dotted line indicates the maximum sustainable exploitation intensity F_{PA} = 0.32.
Source: ICES 2013

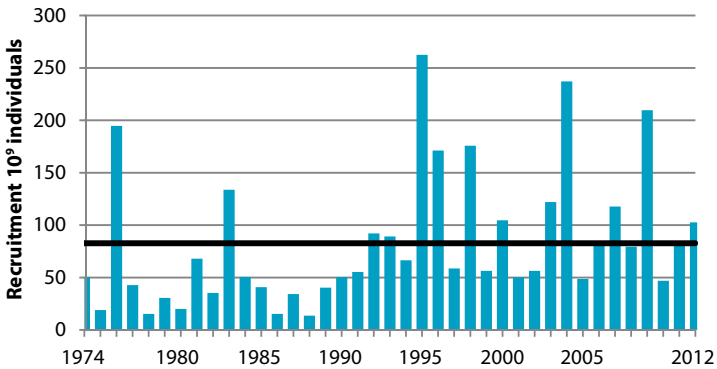


Figure 19.
Dynamics of sprat recruitment (age 1), 1974–2012
The horizontal line marks the long-term average.
Source: ICES 2013

The depletion of spawning stock biomass has been caused by the weak year classes of 2004, 2007 and 2009, as well as high fishing mortality from 2003–2005 and in 2009 and 2010 (Figures 18 and 19). Recent acoustic surveys of pelagic fish stocks in the Baltic Sea show that stocks have declined mainly in the southern part of the Baltic Sea and that stocks have mostly relocated to the northern part of the sea (ICES 2013). Thus, the current status of the sprat stock in the economic zone of Estonia can still be regarded as relatively satisfactory. However, it should be noted that fishing prospects still depend on the overall status of the stock in the Baltic Sea, i.e. the relatively better situation in our waters does not automatically mean better fishing opportunities for our fishermen. In its advice of 2013 the ICES classified the current level of exploitation of the Baltic sprat stock as sustainable, given that the fishing mortality rate has now fallen below the level of sustainable fishing mortality rate FPA = 0.32, being at the level of F_{MSY} = 0.29 from 2010–2012 on average (F_{2012} = 0.29, Figure 18).

Considering that the year classes 2007 and 2009 were weak and that the year class 2010 was close to the long-term average level, the stock and catches of sprat are currently largely dependent on the cohorts of 2008 and 2011, of which the former is around twice as abundant as the long-term average and the latter slightly exceeds the long-term average (ICES 2013). As sprat stocks are extremely dependent on recruitment, any assessment of the prospects of stocks is plagued by considerable uncertainty. For example, the cohorts of 2012 and 2013, whose abundance can only be estimated at present, will account for as much as 47% of the estimated spawning stock biomass of sprat in 2014. The actual abundance of these cohorts will not be clear until 2013 and 2014.

As sprat is an important food for cod, the main predatory fish in the Baltic Sea, the prospects of sprat stocks are undoubtedly influenced by the abundance of cod. Figure 20 compares the average natural mortality of sprat in the age groups 1–6, and the spawning stock biomass of cod in the eastern part of the Baltic Sea from 1974–2012. The clear interdependence depicted allows us to claim that an increase in the spawning stock biomass of cod by 100,000 tonnes over the period has, theoretically, increased the natural mortality of sprat by around 25% on average.

Since 1994 the total mortality of sprat has mostly been influenced by fishing mortality. Natural mortality prevailed from 1978–1986, when the spawning stock biomass of cod ranged from 250,000 to 300,000 tonnes (currently less than 200,000 tonnes, Figure 21).

This shows that with current cod stock levels the key to the management of sprat stock still lies in influencing the fishing mortality of sprat; all the more so as the spatial overlap between cod and sprat stocks has greatly decreased in recent years.

According to the ICES advice, which is based on the maximum sustainable yield approach, the fishing mortality rate of sprat should be less than F_{MSY} = 0.29 in 2014. This corresponds to the total allowable catch of up to 247,000 tonnes (for 2013, the ICES advised a catch of up to 278,000 tonnes; not counting the catch of Russia, the TAC2013 of EU Member States is 250,000 tonnes). The STECF agreed with the advice of the ICES concerning sprat, adding that the share of Russia should be 10.08% under the agreements made between the EU and Russia (Casey *et al.* 2013). Thus the share of the EU would be 222,102 tonnes in 2014, which means that the TAC is reduced by 11% compared to 2012.

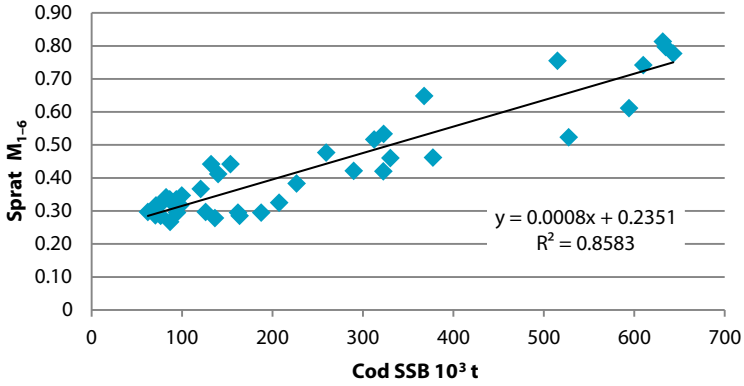


Figure 20.
Estimate of natural mortality of sprat in age groups 1–6 at different levels of Eastern Baltic cod spawning stock biomass, 1974–2012
Source: ICES 2013

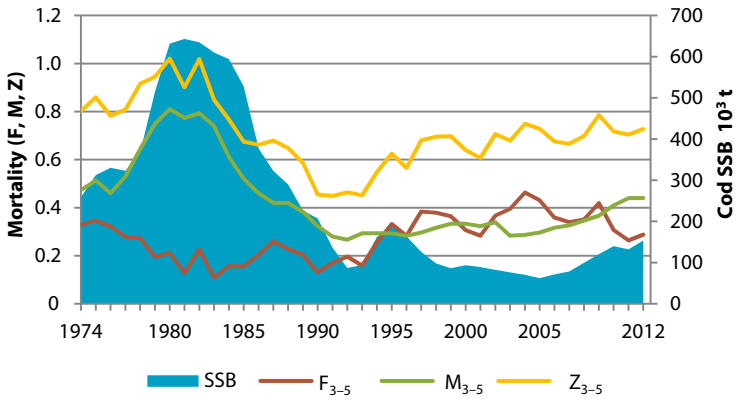


Figure 21.
Fishing mortality (F_{3-5}), natural mortality (M_{3-5}) and total mortality (Z_{3-5}) of sprat and spawning stock biomass (SSB) of Eastern Baltic cod, 1974–2012
Source: ICES 2013

Cod in subdivisions 25–32 (Eastern Baltic)

Being a marine fish species, the distribution and abundance of cod *(Gadus morhua callarias)* in the Baltic Sea depend on suitable reproduction conditions. The main spawning grounds of cod are located on the slopes of the Bornholm, Gdansk and Gotland Deeps. The low salinity of the Baltic Sea is generally not conducive to wide distribution of cod. Then again, subject to the availability of favourable salinity, oxygen and temperature conditions, the high fecundity of cod (similar to that of sprat) may rapidly increase its abundance. This last happened in the late 1970s when the spawning stock biomass of cod tripled in less than a decade (Figure 22). However, the lack of suitable reproduction conditions (no inflow of saline water from the North Sea) and intense and at times uncontrollable fishing, especially in the early 1990s, led to the depletion of the biomass at the same pace. Cod stocks have remained at low levels in the eastern part of the Baltic Sea since the 1990s. According to the revised data, the catches of 2010 and 2011 were slightly over 50,000 tonnes; the catch of 2012 was a little higher: 51,000 tonnes (Table 16).

Thanks to the strong year classes of 2008 and 2009 (which nevertheless still fell significantly short of the long-term average, Figure 23), the abundance and spawning stock biomass of Eastern Baltic cod have increased slightly in recent years – amounting to 153,584 tonnes at the beginning of 2013, which represents

Table 16. Catches of Eastern Baltic cod by country (t), 1992–2012

Year	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Unreported	Total
1992	18 025	1 368	485	2 793	1 250	1 266	13 314	1 793	13 995	0	**54 882**
1993	8 000	70	225	1 042	1 333	605	8 909	892	10 099	18 978	**50 711**
1994	9 901	952	594	3 056	2 831	1 887	14 335	1 257	21 264	44 000	**100 856**
1995	16 895	1 049	1 729	5 496	6 638	4 513	25 000	1 612	24 723	18 993	**107 718**
1996	17 549	1 338	3 089	7 340	8 709	5 524	34 855	3 306	30 669	10 815	**124 189**
1997	9 776	1 414	1 536	5 215	6 187	4 601	31 396	2 803	25 072	0	**88 600**
1998	7 818	1 188	1 026	1 270	7 765	4 176	25 155	4 599	14 431	0	**67 428**
1999	12 170	1 052	1 456	2 215	6 889	4 371	25 920	5 202	13 720	0	**72 995**
2000	9 715	604	1 648	1 508	6 196	5 165	21 194	4 231	15 910	23 118	**89 289**
2001	9 580	765	1 526	2 159	6 252	3 137	21 346	5 032	17 854	23 677	**91 328**
2002	7 831	37	1 526	1 445	4 796	3 137	15 106	3 793	12 507	17 562	**67 740**
2003	7 655	591	1 092	1 354	3 493	2 767	15 374	3 707	11 297	22 147	**69 476**
2004	7 394	1 192	859	2 659	4 835	2 041	14 582	3 410	12 043	19 563	**68 578**
2005	7 270	833	278	2 339	3 513	2 988	11 669	3 411	7 740	14 991	**55 032**
2006	9 766	616	427	2 025	3 980	3 200	14 290	3 719	9 672	17 836	**65 532**
2007	7 280	877	615	1 529	3 996	2 486	8 599	3 383	9 660	12 418	**50 843**
2008	7 374	841	670	2 341	3 990	2 835	8 721	3 888	8 901	2 673	**42 235**
2009	8 295	623		3 665	4 588	2 789	10 625	4 482	10 182	3 189	**48 439**
2010	10 739	796	826	3 908	5 001	3 140	11 433	4 264	10 169	0	**50 277**
2011	10 842	1 180	958	3 054	4 916	3017	11 348	5 022	10 031	0	**50 368**
2012	**12 102**	**686**	**1 201**	**2 432**	**4 269**	**2 212**	**14 007**	**3 954**	**10 109**	**0**	**50 972**

Source: ICES 2013

around 64% of the long-term average (239,206 tonnes). The EU Multi-annual Management Plan for cod stocks in the Baltic Sea implemented since 2008 is likely to have contributed to the slight recovery in the cod stock.

The aim of the plan is to rebuild safe biological limits of the Eastern population and ensure stock levels at which the full reproductive capacity of the population is maintained and the highest long-term yields can be reached (1098/2007/EC).

Despite the relatively low biomass, the fishing mortality of cod stocks has been below the level of $F_{MSY} = 0.46$ in recent years. However, the estimated fishing mortality rate ($F_{2012} = 0.37$) exceeds the target level set out in the EU Management Plan ($F_{MGT} = 0.3$; Figure 22). It should be noted that in 2013 the ICES also altered its estimate of F_{MSY} for Eastern Baltic cod. The F_{MSY}, which had been set at a level of 0.3 (ICES 2012) and which also served as the basis for the EU Management Plan, was changed to 0.46 from 2013 (ICES 2013). The new estimate has thus resulted in a contradiction in the general principles of the EU Management Plan and the advice of the ICES for exploitation which is based on the maximum sustainable yield.

There is still no commercial cod resource in Estonian waters, and directed fishing for this species is not economically feasible. However, Estonian vessels fish for cod in the Southern Baltic in small quantities. In 2012 the TAC of Eastern Baltic cod (EU + Russia) was 74,200 tonnes. Estonian fishermen caught 686 tonnes (1180 tonnes in 2011). In 2013 the total allowable catch was 65,900 tonnes.

The advice of the ICES regarding the TAC of Eastern Baltic cod is based on the Multiannual Management Plan for cod stocks in the Baltic Sea which states that this stock unit's advisable fishing mortality rate is $F_{MGT} = 0.3$ (Fsq = 0.37). This

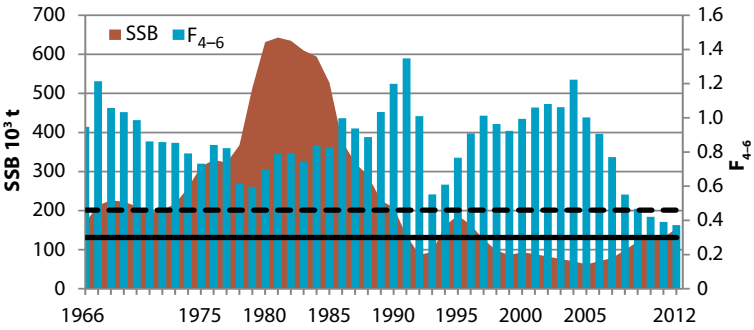


Figure 22. Eastern Baltic cod: spawning stock biomass (SSB) and fishing mortality in age groups 4–6 ($F_{4–6}$), 1966–2012. The horizontal dotted line represents the fishing mortality level $F_{MSY} = 0.46$ and the solid line marks the fishing mortality target level $F_{MGT} = 0.3$ set in the Management Plan. Source: ICES 2013

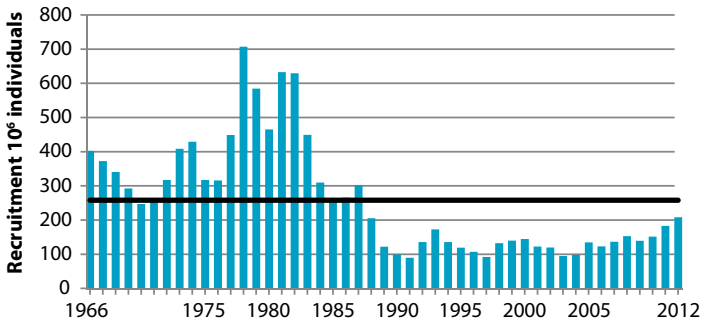


Figure 23. Eastern Baltic cod: dynamics of abundance of recruitment (age 2), 1966–2012. The horizontal line marks the long-term average. Source: ICES 2013

means that the total allowable catch of the EU and Russia will be 70,301 tonnes in 2014 (65,900 tonnes in 2013). The ICES also notes that this advice applies on condition that discards remain at the average level of the last three years. This should allow for an increase in SSB to 264,700 tonnes in 2015. The STECF agreed with the advice of the ICES (Casey *et al.* 2013).

Despite the slight increase in the stock, cod is still concentrated in the Southern Baltic. There is no commercial cod stock in the economic zone of Estonia.

ESTONIA'S TRAWL FLEET IN THE BALTIC SEA

General overview of sector

In 2012, catches were reported for a total of 36 trawlers with a combined main engine power of 10,329 kW and a combined gross tonnage (GT) of 3959. The average age of the vessels was 27 years, and a total of 188 people were employed on them. Compared to 2011, the number of trawlers engaged in fishing decreased by six i.e. 14% in 2012 (Figure 24).

In 2012 the Estonian trawl fleet's final sprat and herring quotas (after quota transfers) were 27,905 and 15,059 tonnes, respectively (Figure 25). The sprat catch quota decreased by 24% and the herring quota decreased by 22% compared to the preceding year. While adverse weather conditions prevented the quota from being used up in 2011, the herring and sprat quota uptake was close to the maximum i.e. 99% in 2012. In contrast, 46% of the cod quota remained unused. Among the reasons for this, both the scarcity of fish and the low market price of cod have been mentioned.

Figure 24. Number, combined gross tonnage (GT) and combined power of main engines (kW) of fishing vessels engaged in fishing, 2005–2012
Source: MoA

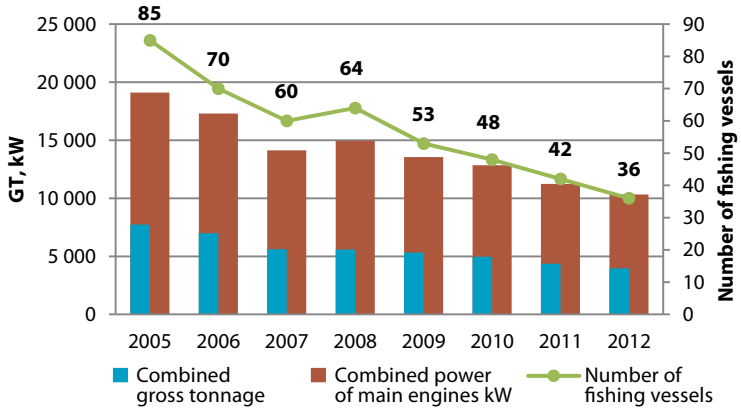
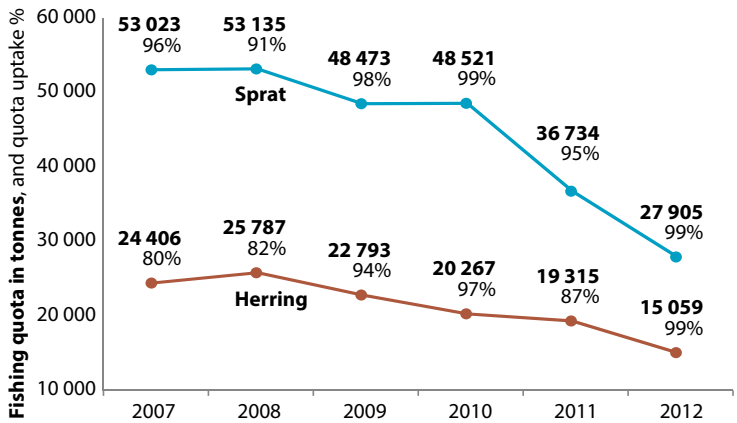


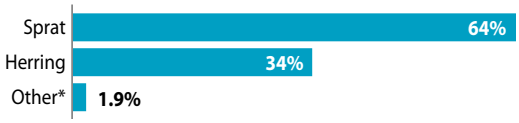
Figure 25. Estonian trawl fleet's final sprat and herring quotas (after quota transfers) and quota uptake (%), 2007–2012
Source: MoA



In 2012 the historical fishing rights to catch sprat, herring and cod in the Baltic Sea on the basis of fishing vessels' fishing permits were distributed between 25, 27 and 13 companies respectively. The total catch of Estonian trawlers in the Baltic Sea amounted to 43,483 tonnes in 2012. Based on average first sales prices, the value of the catch was 9.2 million euros. In terms of species, sprat and herring prevailed in catches, but small amounts of cod, smelt, flounder and eelpout were also caught (Figure 26). The proportion of trawlers in Estonian fishers' commercial fishing in the Baltic Sea amounted to 83% in 2012.

Sprat and herring were mainly landed at Estonian ports, where the catch was sold to fish freezing or processing companies, unless the fishing company itself was engaged in the processing and marketing of fish. Fish was also landed at ports of Latvia, Poland, Denmark and Lithuania (Table 17). Compared to 2011, the proportion of fish landed at foreign parts decreased significantly – from 4.4% in 2011 to just 1.9% in 2012, with no fish landed in Sweden. Estonian trawlers landed fish at 17 Estonian ports (Table 18). The largest quantities of catch were landed at Dirhami, Veere and Miiduranna, where more than half (53%) of the fish caught by Estonian trawlers was brought ashore. Most of the sprat and herring caught by the Estonian trawl fleet in 2012 were sold on the eastern market (Russia, Ukraine etc.) in frozen form.

Cod, on the other hand, was landed and sold at foreign ports (mostly Poland and Denmark).



* Cod 1.6%; smelt 0.24%; flounder 0.07%; eelpout 0.008%

Figure 26. Proportion of different fish species caught from Baltic Sea in catches of Estonia's Baltic trawl fleet in 2012
Source: MoA

Table 17. Landings (t) in different countries of fish caught from Baltic Sea by Estonian trawlers in 2011 and 2012

Species	Year	Estonia	Latvia	Poland	Sweden	Denmark	Lithuania
Sprat	2011	34 254	189		315	218	
	2012	**27 697**					
Herring	2011	16 184	408		83	53	
	2012	**14 818**	**141**				
Cod	2011		50	674	120	139	23
	2012		**36**	**424**		**157**	**19**
Smelt	2011	76	4				
	2012	**107**	**1**				
Flounder	2011		9	25			1
	2012		**6**	**23**		**<1**	**<1**
Eelpout	2011	3					
	2012	**3**					
Total	2011	50 517	660	699	518	410	24
	2012	**42 625**	**184**	**447**	**0**	**157**	**20**

Source: MoA

Table 18. Landings in Estonian ports of fish caught from Baltic Sea by Estonian trawlers in 2012

County	Place of landing	Landings, t	Proportion (%) of total landings of trawlers
Lääne	Dirhami	9754.5	22.9
Saare	Veere	7087.9	16.6
Harju	Miiduranna	5734.3	13.5
Lääne	Westmeri	3461.9	8.1
Lääne	Virtsu	3257.8	7.6
Harju	Meeruse	2878.0	6.8
Hiiu	Lehtma	2649.8	6.2
Saare	Mõntu	2362.5	5.5
Saare	Roomassaare	1722.7	4.0
Harju	Paldiski Lõunasadam	1419.3	3.3
Saare	Saaremaa	1034.8	2.4
Harju	Leppneeme	874.4	2.1
Pärnu	Pärnu	200.1	0.5
Ida-Viru	Toila	165.3	0.4
Pärnu	Munalaiu	14.1	0.0
Harju	Kelnase	8.1	0.0
Pärnu	Kihnu	0.1	0.0

Source: MoA

The year was characterised by a continued decrease in fishing quotas (in particular as regards sprat) and an increase in operating expenses. The decline in quotas was offset by a slight rise in the first sales prices of fish (sprat and herring) compared to the preceding year. To increase sales and profits and alleviate the shortage of raw material, several Estonian fishing companies acquired subsidiaries in Finland and Lithuania. While no significant catch figures can be

reported for the Lithuanian subsidiaries in 2012, in Finland the fishing vessels owned by Estonians caught nearly a third of the sprat and herring quota of Finland, i.e. around 40,000 tonnes of fish. Herring caught in Bothnian Bay accounted for most of the catch (around 30,000 tonnes). Fisheries subsidies paid in 2012 to fishing companies for permanent cessation of fishing activities by scrapping or permanent reassignment of fishing vessels amounted to 250,946 euros. In addition, 339,690 euros was paid for investments in fishing vessels.

On 6 November 2008, Decision 2008/949/EC of the European Commission took effect by which a multiannual programme for establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy was adopted. According to the Commission Decision, Estonia's Baltic trawlers can be divided into two length classes: 12–18 m and 24–40 m[1]. In 2012, large trawlers prevailed. Preference for large trawlers in fishing can be explained by their efficiency. Greater efficiency enables e.g. higher wages to be paid to crews.

Basic and economic indicators of 12–18 m length class trawlers

In 2012, five companies were engaged in fishing with small trawlers. Seven vessels were used for fishing, i.e. three fewer than the year before (Table 19). These trawlers caught a total of 1062 tonnes of fish (herring and sprat), representing just 2.4% of the total catch of the Estonian trawl fleet in the Baltic Sea. The volume of fish catch decreased by 14% over the year. Despite this decline, the first sales value of the catch increased due to favourable first sales prices in 2012 by 2%, reaching 208,230 euros. Compared to the preceding year, the proportion of sprat in the total catch of small trawlers grew, accounting for 61% (Figure 27). On average,[2] 14 fishermen were employed on small trawlers in 2012.

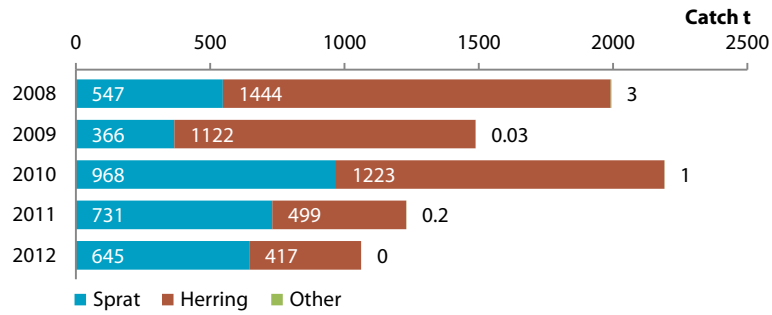


Figure 27. Sprat and herring catches (t) of 12–18 m length class trawlers, 2008–2012
Source: MoA

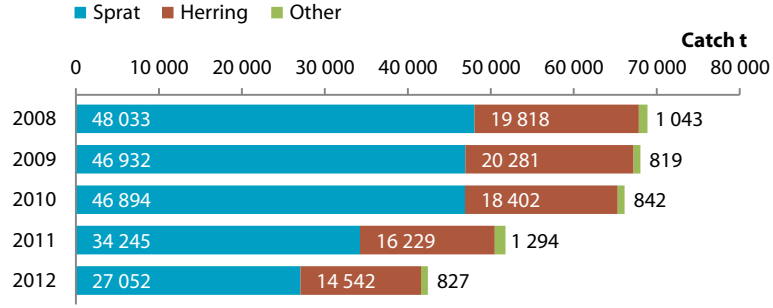


Figure 28. Catches of sprat, herring and other species (t) of 24–40 m length class trawlers, 2008–2012
Source: MoA

[1] Except the Ann-Mari I fishing vessel, which is 19.99 metres long, but which belongs to the group of large trawlers due to its engine power (220 kW) and tonnage (99 t)

[2] Average number of employees during the year

Basic and economic indicators of 24–40 m length class trawlers

In 2012, catches were reported for 29 large vessels owned by 19 companies. These trawlers caught 42,421 tonnes of fish, whose estimated total value amounted to around 9 million euros based on average first sales prices. Similarly to small trawlers, catches were dominated by sprat: sprat and herring accounted for 64% and 34%, respectively, of the total catch for 2012. In comparison with previous years, the proportion of sprat has decreased significantly (Figure 28).

Compared to 2011, the number of large trawlers engaged in fishing decreased by three i.e. 9% in 2012 (Table 20). As a result, the number of employees changed: whereas in 2011 the average number of fishermen employed on these trawlers was 199, in 2012 this figure decreased by 13% and amounted to 174. The total volume of fish catch declined as well, but the number of trawling hours per vessel increased. This may have resulted from the lower number of fishing vessels and the slower exhaustion of the fishing quota. The average annual wage cost per employee was 15,083 euros in 2012, which was 22% higher than in 2011. The gross value added of the segment of large trawlers amounted to around 4.5 million euros. Fishing-related operating expenses of trawlers of the 24–40 m length class amounted to 8 million euros in 2012. Labour (44%) and fuel (29%) made up the largest proportion of expenses (Figure 29).

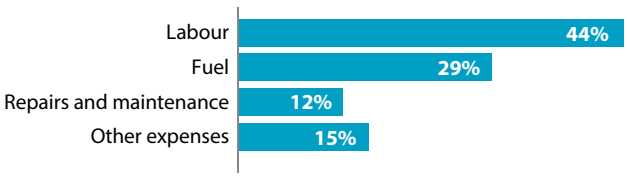


Figure 29. Distribution of operating expenses related to fishing operations of fishing vessels of 24–40 m length class in 2012
Source: UT EMI

Table 19. Basic indicators related to fishing operations of 12–18 m length class trawlers, 2008–2012

	2008	2009	2010	2011	2012
Number of fishing vessels	23	14	12	10	7
Catch, 10^3 t	2	1.5	2.2	1.2	1.1
Value of catch based on first sales prices, 10^3 €	322	207	285	204	208
Average number of employees	37	22	20	17	14
Average number of trawling hours per vessel	154	163	178	118	162

Sources: MoA, UT EMI

Table 20. Basic and economic indicators related to fishing operations of 24–40 m length class trawlers, 2008–2012

	2008	2009	2010	2011	2012
Number of fishing vessels	40	39	36	32	29
Catch, 10^3 t	68.9	68	66.1	51.8	42.4
Value of catch based on first sales prices, 10^6 €	11.9	10.7	9.2	9.9	9
Average number of employees	236	227	207	199	174
Average annual wage cost per employee, €	12 057	12 129	12 510	12 368	15 083
Average number of trawling hours per vessel	1 152	1 025	812	1 080	1174
Average fuel price per litre, €	0.503	0.377	0.486	0.709	0.770
Gross value added, 10^6 €	7.3	6.7	5.2	5.2	4.5

Sources: MoA, UT EMI

Inland fisheries

LAKE VÕRTSJÄRV FISHERY

In 2012 a total of 208.7 tonnes of fish was caught from Lake Võrtsjärv, which was slightly more than in the preceding year, but significantly less than during the period 1999–2010 (Table 21). The biggest catches were produced by bream (87.2 tonnes), pike (46.6 tonnes) and pikeperch (37.8 tonnes). Trap nets were the main fishing gear and provided 79% of the total catch. Bream accounted for half of the total catch, followed by pike (22%) and perch (8%, Figure 30). 21% of the total catch was taken with gill nets, with pikeperch accounting for 65%.

The amount of fishing gear and the fishing effort have increased slightly on Lake Võrtsjärv in recent years. In 2012, permits were issued for fishing with 358 trap nets and 372 gill nets, plus 60 recreational gill net permits. In 2012 a total of 98 commercial fishing permits were issued for fishing on Lake Võrtsjärv, which were distributed between 48 permit holders. After 1994, such a high number of Lake Võrtsjärv fishing permit holders has not been seen since 2005 (Figure 31).

Figure 30. Proportion (%) of fish species in trap net catches from Lake Võrtsjärv in 2012
Source: EULS, MoA

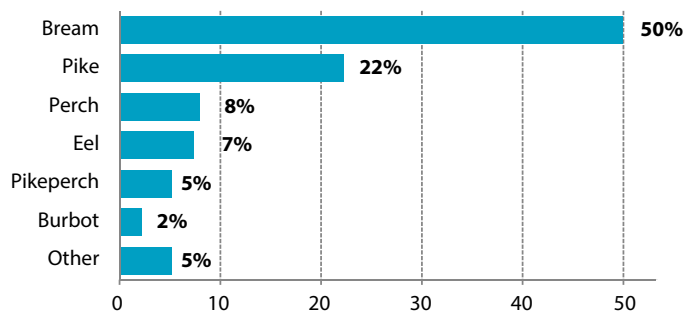
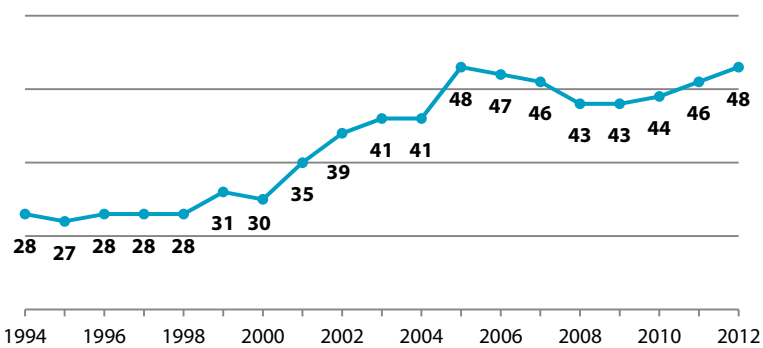


Figure 31. Number of commercial fishing permits issued for Lake Võrtsjärv, 1994–2012
Source: Fisheries Information System of the MoA, EULS



Eel. The eel catch amounted to 12.2 tonnes in 2012, which was slightly more than in the two preceding years, but still just a third of the long-term average (33.7 tonnes). The main reason for the decrease in catches is the sharp decline in the number of eels introduced into the lake since the beginning of the 2000s when the price of restocking material rose dramatically on the world market. Considering the average restocking volume of the last ten years (349,000 farmed

Table 21. Catches (t) from Lake Võrtsjärv, 1971–2012

Year	Eel	Pikeperch	Pike	Bream	Burbot	Perch	Other*	Second-rate fish	Total
1971	6.5	28.1	12.9	20.1	2.7	4.5	0.5	75.3	**150.6**
1972	16.4	32.3	14.0	21.4	2.4	3.3	0.8	80.7	**161.4**
1973	21.3	43.0	11.5	16.0	1.2	3.8	0.4	92.3	**184.6**
1974	18.7	50.7	17.6	25.9	2.7	0.9	0.2	42.6	**161.9**
1975	36.9	51.8	12.3	23.8	1.3	1.6	0.3	41.3	**151.1**
1976	41.6	46.3	9.0	27.1	1.6	1.0	0.1	33.1	**155.1**
1977	50.0	45.3	12.8	33.2	1.7	0.6	0.3	20.8	**156.3**
1978	45.0	62.0	17.8	31.7	2.6	2.7	0.3	42.1	**209.2**
1979	19.0	73.0	19.0	26.1	3.0	3.0	0.8	40.3	**210.2**
1980	17.8	50.9	24.8	42.0	11.2	9.1	0.6	53.1	**210.7**
1981	16.4	42.4	29.3	63.0	17.9	7.9	0.4	68.4	**247.1**
1982	10.8	55.2	34.5	45.8	8.8	9.2	0.3	72.0	**242.2**
1983	24.6	50.5	51.4	60.0	7.4	8.8	0.6	85.3	**274.8**
1984	66.7	36.9	50.4	59.9	8.9	7.2	0.3	104.0	**292.2**
1985	71.9	59.0	39.0	100.1	7.4	5.4	0.3	168.4	**446.3**
1986	55.6	68.2	61.4	74.7	6.9	9.4	0.6	205.4	**498.5**
1987	61.2	45.5	35.0	76.9	6.6	7.0	1.2	163.3	**391.1**
1988	103.7	53.4	48.7	127.0	6.6	6.3	1.2	330.4	**634.8**
1989	47.6	44.5	56.4	196.7	5.9	7.4	1.4	303.6	**719.6**
1990	56.1	18.8	45.8	194.4	2.5	4.4	1.0	147.8	**414.7**
1991	48.5	26.7	30.5	139.4	4.8	3.7	1.4	212.5	**419.0**
1992	31.0	14.0	25.0	100.0	3.3	6.2	0.3	97.7	**246.5**
1993	49.0	36.0	32.0	81.0	7.0	8.0	0.8	107.0	**271.8**
1994	36.9	25.5	23.4	87.8	4.2	5.4	1.4	79.1	**226.8**
1995	38.8	28.3	19.4	68.7	1.4	5.2	0.1	112.8	**235.9**
1996	34.1	22.3	28.1	69.1	3.0	2.1	0	88.2	**212.8**
1997	40.3	20.7	19.3	92.3	3.4	2.4	0.1	98.0	**236.2**
1998	21.8	43.7	16.1	70.5	3.8	2.9	0.1	81.9	**219.0**
1999	37.4	34.5	24.9	47.8	2.6	12.1		116.7	**275.9**
2000	38.8	29.5	40.7	54.4	3.8	18.3	2.0	150.1	**337.6**
2001	37.6	32.8	50.8	56.8	4.0	12.6	0.2	191.7	**376.5**
2002	20.4	25.2	44.8	30.5	3.5	9.7	0.1	184.3	**318.8**
2003	26.4	19.2	49.8	42.3	6.0	14.2	0.1	157.9	**315.9**
2004	20.1	27.3	55.5	59.1	4.1	10.1	0.1	176.9	**353.2**
2005	17.6	46.7	52.6	57.3	2.5	15.4		192.5	**379.1**
2006	19.9	42.3	79.5	65.5	2.8	44.1	0.1	127.9	**381.7**
2007	21.5	29.7	57.0	105.2	3.6	17.1	0.1	174.6	**407.3**
2008	20.5	48.3	31.6	158.2	7.8	10.8	1.7	229.0	**507.9**
2009	13.6	74.1	33.0	81.5	2.9	9.0	1.6	131.9	**347.6**
2010	10.3	29.1	34.3	56.9	2.3	13.7	0.8	119.2	**266.6**
2011	11.2	40.7	32.2	77.9	2.3	16.9	1.2		**182.4**
2012	**12.2**	**37.8**	**46.6**	**87.2**	**3.8**	**13.4**	**7.7**		**208.7**

* 'Other' includes tench, Crucian carp, Gibel carp and ide Source: EULS

Note: The figures for 2000–2010 also include catches from restricted and recreational fishing in addition to commercial fishing.

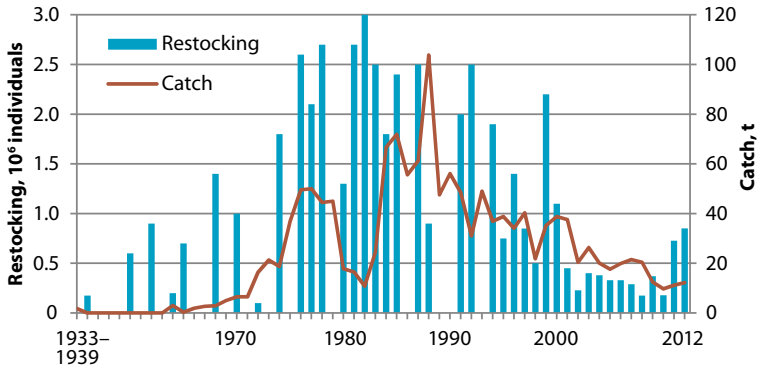


Figure 32.
Eel restocking and catches on Lake Võrtsjärv, 1933–2012
Source: EULS

eels), catches of 20–25 tonnes should be reflected in catch statistics. However, as the number of pre-grown eels introduced into the lake was 175,000 in 2008 and 178,000 in 2010, catches are bound to decline from 2014 (Figure 32). For better catches, the restocking volume should be increased considerably.

The rising water level in the lake continues to be one of the reasons for the low eel catches, limiting in particular the quantity of eels caught in trap nets. Although recreational fishing with longlines and marking results indicate that the stock remains at the same level, the catch of 2012 was smaller than the quantity projected.

For the first time in the history of Lake Võrtsjärv, both pre-grown eels (157,000) and elvers were introduced into the lake in 2011. This was also done in 2012: in March, 271 kg of elvers (910,000 individuals) were brought to Estonia, of which 765,000 were released into Lake Võrtsjärv. In addition, 87,000 pre-grown eels were introduced into Lake Võrtsjärv on 23 August with the support of the European Fisheries Fund. The average weight of the eels was 10 grams, which is almost twice as much as the introduction weight in previous years (Figure 32).

Fishermen continue to add value to their catches locally, selling smoked or pickled eels in tins or glass jars. Thus the price of raw fish almost doubled in home yard sales. Also, the first sales price of eel has increased in the last three years (€5.72/kg in 2010; €6.56/kg in 2011; €7.35/kg in 2012).

Pikeperch. Pikeperch stock and catches have been strong on Lake Võrtsjärv for years. However, the catch of 37.8 tonnes taken in 2012 was somewhat smaller than the year before. Pikeperch is mostly caught using gill nets (77% in 2012); in 2012, ice conditions did not permit the use of gill nets until February and thus the catch of January was lost. In February, by contrast, more than ten tonnes of pikeperch were caught and the winter-spring catch turned out to be comparable to that of 2011.

The fact that pikeperch year classes remain in commercial fishing catches for up to ten years reflects balanced fishing intensity. Unlike in other lakes, the minimum size (TL) of pikeperch in Lake Võrtsjärv is 51 cm, which enables pikeperch to reproduce for at least a couple of years before being caught. As the natural mortality rate of this predatory fish at the top of the food chain is low, each pikeperch puts on 300–500 g in weight each year. This ultimately means higher catches of each year class.

Table 22. General assessment of state of stocks and fishing mortality in Lake Võrtsjärv in 2012 and the near future, by key species

Species	State of stocks*			Fishing mortality
	2012	until 2013	until 2016	
Eel	3	3	2	low
Pikeperch	2	1	1	moderate
Pike	2	1	2	moderate
Bream	3	2	2	high
Perch	3	3	3	moderate
Burbot	3	2	2	low
Lake Peipsi smelt	3	2	?	insufficient data

* State of stocks – 1: good; 2: moderate; 3: poor. Source: EULS

Pike. The pike catch amounted to 46.6 tonnes in 2012, being the highest of the past five years and exceeding the catch of 2011 (32.2 t) by 45%.

Bream. Bream produces the biggest catches on Lake Võrtsjärv. In 2012 the bream catch amounted to 87.2 tonnes, which is more than in the three preceding years. Unlike other water bodies, no minimum size has been set for the bream in Lake Võrtsjärv. Unfortunately, the largest share of the catch was taken during a short period of time and fishermen had real difficulties selling the bream. The first sales price of bream weighing over 1 kg fell below 50 cents at times. Therefore, fishermen did not get the expected profit in spite of the high catch of 2012. In a longer-term comparison, the abundance of large bream is currently high in Lake Võrtsjärv, the stock is in good condition and the size and mean weight of fish is above the average.

The prospects of catches from Lake Võrtsjärv for the next few years are good or even very good for most key species (Table 22).

LAKE PEIPSI FISHERIES

State of fish stocks

At the end of 2011 the fish stocks of Lakes Peipsi and Lämmijärv were generally in the usual state observed in recent years. As in the past, the bulk of essential commercial fish stocks comprised perch, pikeperch and bream. Stocks of other target species were smaller, and stocks of fish species that prefer cold water (whitefish, smelt, vendace and burbot) remained at low levels.

The good condition of perch stock, in particular, but also of pike stock, enabled the catch quota for 2012 to be increased (Table 23). The vendace stock also allowed commercial fishing to be continued in the lake.

Pikeperch. Pikeperch stock remained in satisfactory condition and was composed mainly of the cohort of 2009 at the end of both 2011 and 2012 (Tables 24 and 25). The previous abundant pikeperch cohort born in 2005 has lost its relevance. As no new strong pikeperch cohorts appeared in the lake in 2010 or 2011 (or in 2012, according to the data available in 2013), pikeperch stock is bound to decline in the coming years. In addition, the pikeperch in the lake are plagued by

Table 23. **Estonian national fishing quotas (t) on Lakes Peipsi and Lämmijärv, 2008–2012 (quota transfers and deductions on account of overfishing taken into account)**

Species	2008	2009	2010	2011	2012	Average
Pikeperch	1000	600	546	672	714	706
Perch	820	850	1200	900	1400	1034
Pike	95	85	70	110	160	104
Bream	700	570	460	600	614	589
Roach	475	330	330	305	300	348
Burbot	50	50	50	50	50	50
Ruff	300	300	300	300	300	300
Smelt	5	5	5	5	5	5
Whitefish	7	5	7	5	3	5
Vendace	1	1	1	10	15	6
Other	50	50	50	50	50	50
Total	**3503**	**2846**	**3019**	**3007**	**3611**	**3197**

Source: UT EMI

Table 24. **Pikeperch abundance (number of individuals per trawling hour) based on trawl fishery on Lake Peipsi from 2008–2012 (the numbers in bold and italic indicate strong year classes of 2005 and 2009, respectively)**

	Age group					
Catch year	1+	2+	3+	4+	>4+	Total
2008	9	0	**102**	1	0	664
2009	33	4	0	**35**	2	182
2010	*347*	32	3	0	**10**	392
2011	0	*180*	8	1	1	189
2012	41	**3**	*59*	1	0	104

Source: UT EMI

Table 25. **Pikeperch weight (kg per trawling hour) based on trawl fishery on Lake Peipsi from 2008–2012 (the numbers in bold and italic indicate the strong year classes of 2005 and 2009, respectively)**

	Age group					
Catch year	1+	2+	3+	4+	>4+	Total
2008	1	0	**49**	3	0	54
2009	3	1	0	**37**	5	47
2010	*30*	20	4	0	**22**	75
2011	0	*43*	12	2	3	60
2012	4	1	*35*	1	1	42

Source: UT EMI

Table 26. **Perch abundance and weight (number of individuals and kg per trawling hour) based on trawl fishery on Lake Peipsi from 2008–2012 (the numbers in bold and italic indicate the abundance of the year classes 2005 and 2009, respectively)**

	Abundance / age group						Total
Catch year	1+	2+	3+	4+	>4+	Kokku	weight
2008	2	0	**1 267**	12	3	1 284	81
2009	7	7	0	**812**	14	840	79
2010	*4 422*	46	4	4	**546**	5 022	178
2011	1	*1 715*	32	0	**253**	2 001	104
2012	0	**0**	*1318*	14	**55**	1387	90

Source: UT EMI

nutrition issues, the resulting slow growth of juvenile fish and high natural mortality, which are in turn amplified by high hidden fishing mortality. For example, from 2010–2012 the official fishing mortality (approximately 2.4 million individuals) of the pikeperch cohort of 2009 accounted for just 22% of its total mortality (approximately 10.9 million individuals).

Pikeperch is currently the second most important target species. Estonian fishermen's average catch on Lake Peipsi amounted to 620 tonnes during the years 2008–2012. The average catch taken from the entire lake (including the Russian side) was 1089 tonnes.

Perch. Perch stock is in good condition thanks to the addition of the strong year class of 2009 (Table 26). The stock of the previous strong cohort of 2005 is becoming exhausted, as is the case with pikeperch. Recruitments are weak and the stock will start to decline in the coming years. In terms of catches, perch has been the number one target species both in Estonia (average annual catch of 916 tonnes) and throughout the lake (average catch of 1613 tonnes in the years 2008–2012).

Bream. Bream stock remains in good condition (Figure 33) and is commercially exploitable for the most part (according to the data of 2012, full-sized fish accounted for 65% of the overall abundance and 90% of the weight of the stock). The bulk of the stock is comprised of the bream cohorts of 2005 and 2006, with the recruitments of subsequent years being weaker. While the record quantity of bream was caught from Lakes Peipsi and Pskov in 2012 (1325 tonnes), the Estonian side reached this milestone a year before.

Pike. Both pike stocks and catches have increased significantly (Figure 34). The year classes of 2007, 2008 and 2009 prevail. Catches are currently around three times larger than a few years ago. This applies to both the Estonian side of the lake and to the entire lake (the catch of 2012 amounted to 339 tonnes, but the catch of 2008 was 114 tonnes).

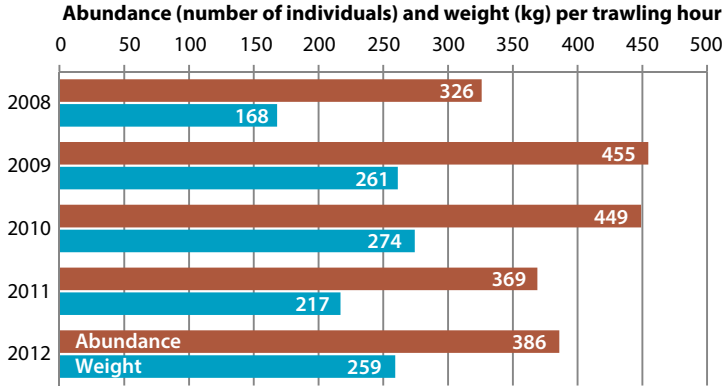


Figure 33. Bream abundance and weight (number of individuals and kg per trawling hour) based on trawl fishery on Lake Peipsi, 2008–2012
Source: UT EMI

Figure 34.
Pike abundance and weight (number of individuals and kg per trawling hour) based on trawl fishery on Lake Peipsi, 2008–2012
Source: UT EMI

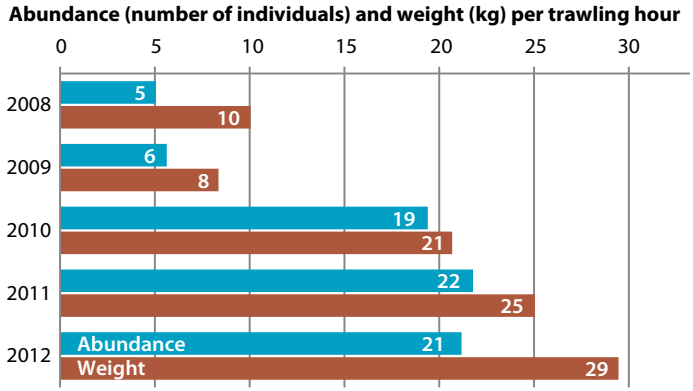
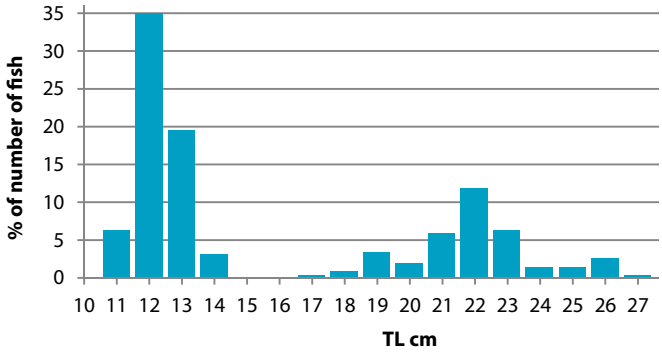


Figure 35.
Composition of vendace stock based on trawl fishery in autumn 2012
Source: UT EMI



Vendace. The stock of this fish species is slowly recovering. In 2012 a new cohort appeared (11–14 cm long fish, presented in Figure 35). Official fishing is still non-existent and the resumption of the use of pound nets is inhibited by legal problems.

Catches

No changes were observed in the number of companies and fishermen operating on the lake in 2012 (Table 27). The permitted fishing capacity was the same as in previous years and its bulk consisted of 3000 large-mesh gill nets, 911 trap nets and 20 demersal seines. The catch of 2012 was around 300 tonnes higher than the catch taken in the preceding year and the average catch of recent years (Table 28). While the increased catch of perch contributed to the growth of the total catch the most, catches of pike and bream were notable too. Predatory fish (pikeperch, perch, pike and burbot) account for around 70% of the total catch; the proportion of fish feeding on plankton (vendace, smelt and whitefish) is very small – only around 0.1%. The rest of the catch (approximately 30%) consisted of non-predatory fish (bream, roach and ruff).

As usual, spring and autumn were the most productive fishing seasons on the lake, but the catch taken in autumn was considerably higher compared to

Table 27. Number of companies and fishermen related to Lake Peipsi, 2006–2012

	2006	2007	2008	2009	2010	2011	2012
Companies	96	94	87	68	69	70	68
Total number of fishermen	530	490	300	336	365	405	383

Source: MoA

Table 28. Estonian catches (t) from Lakes Peipsi and Lämmijärv from 2008–2012 and the average catch of these years

Species	2008	2009	2010	2011	2012	Average
Pikeperch	622	654	508	672	646	620
Perch	746	808	1205	757	1061	916
Pike	55	66	46	100	153	84
Bream	370	537	435	578	577	500
Roach	204	189	198	225	207	205
Smelt	0	0	0	0	0	0
Whitefish	1	3	1	0	0	1
Vendace	1	1	0	1	3	1
Burbot	25	27	26	30	21	26
Other species	65	76	41	9	3	39
Total	**2 089**	**2 360**	**2 461**	**2 371**	**2671**	**2390**

Source: MoA

Table 29. Estonian catches (t), quotas (t), uptake (%) and balances (t) of quotas for Lakes Peipsi and Lämmijärv in 2012

Species	Catch	Quota	Uptake	Balance
Pikeperch	646	714	90	68
Perch	1061	1400	76	339
Pike	153	160	96	7
Bream	577	614	94	37
Roach	207	300	69	93
Whitefish	0,3	3	8	3
Smelt	0	5	0	5
Vendace	2,6	15	17	12
Burbot	21	50	42	29
Ruff	2	300	1	298
Other	1	50	3	49
Total	**2671**	**3611**	**74**	**940**

Source: MoA

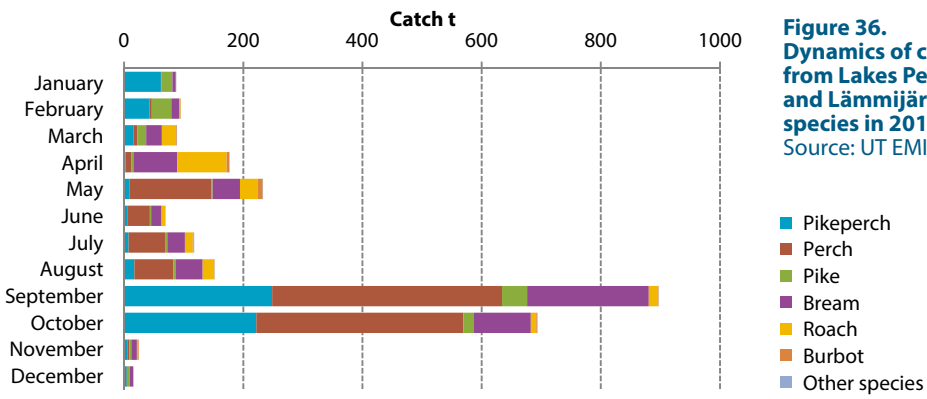


Figure 36. Dynamics of catches from Lakes Peipsi and Lämmijärv by species in 2012
Source: UT EMI

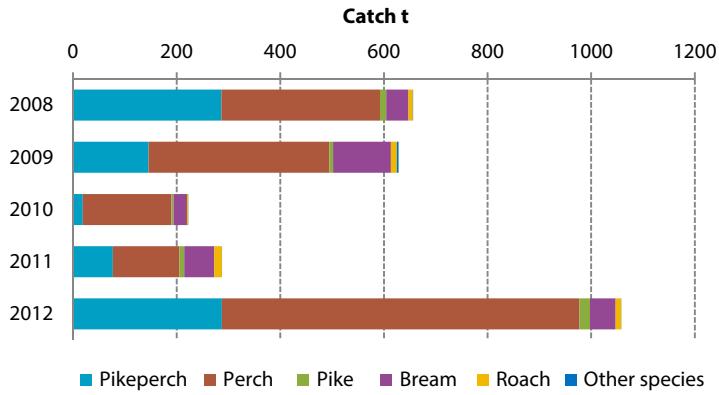


Figure 37. Quantities and species composition of catches taken with Danish seines from Lakes Peipsi and Lämmijärv, 2008–2012
Source: UT EMI

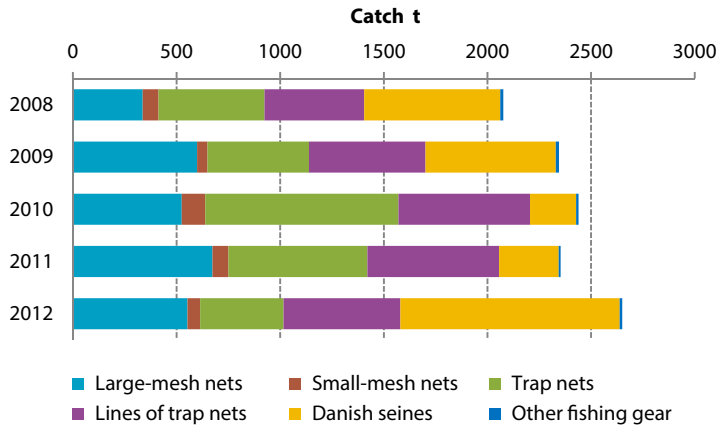


Figure 38. Catch from Lakes Peipsi and Lämmijärv by fishing gear, 2008–2012
Source: UT EMI

other periods (Figure 36). The biggest catches of pikeperch, perch, bream and pike were taken in autumn. This disproportion was mainly due to the composition of stocks (the new cohorts of pikeperch, perch and pike did not become commercially exploitable until autumn) and, to a lesser extent, the growth of interest in fishing (in the case of bream).

As more than 90% of the quotas of the two primary target species (pike and bream) had been used up (Table 29), fishing was suspended on the Estonian side earlier than agreed – in early November – and for more than a month. The remaining quotas enabled fishing to be reopened with large-mesh nets at the end of the year.

In 2012, after a number of years, Danish seines provided the biggest catches – 1058 tonnes or 40% of the total catch. This was due to an increase in the catch of perch as the main target species of Danish seines (Figure 37) which, in turn, resulted from the suitable composition of the stock. The total catch of traps and lines of traps was almost as large – 966 tonnes or 36% of the total catch. The quantity taken with nets was of the usual level in 2012 (614 tonnes or 23% of the total catch, Figure 38). The catch and proportion of other fishing gear remained insignificant.

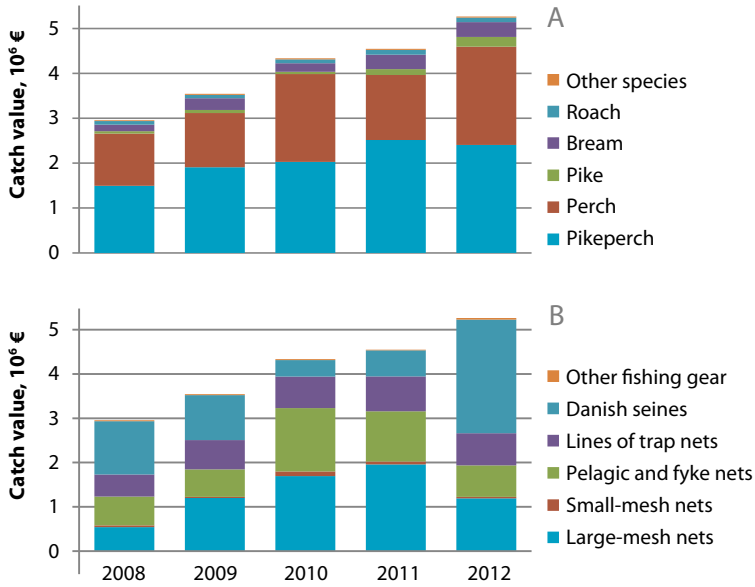


Figure 39. Value of catches from Lakes Peipsi and Lämmijärv based on average first sales prices of fish, 2008–2012
A: by species
B: by fishing gear
Source: MoA, UT EMI

Catch value

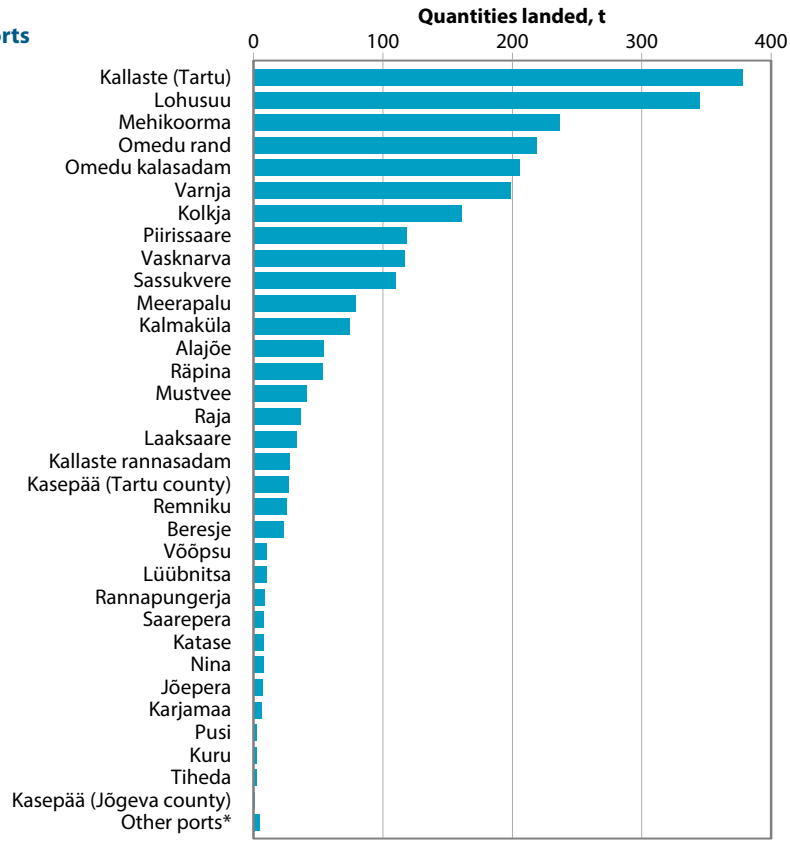
The value of catches taken from the lake (calculated on the basis of the average first sales prices of fish in Estonia) has been growing since 2008 and exceeded 5 million euros for the first time in 2012 (Figure 39). Pikeperch and perch were traditionally the most valuable species and produced around 46% and 42% of the catch, respectively. The catch of perch increased and thus demersal seines were the most profitable fishing gear in 2012. The values of the catches of demersal seines and other fishing gear were almost equal (around 2.6 million and 2.7 million euros, respectively).

There are a number of landing sites: fish is handled in as many as 45 lakeside settlements. The largest fish ports are in Kallaste and Lohusuu, where more than 300 tonnes of fish were landed during the year. Approximately 100 or more tonnes of fish were landed at another ten ports (Figure 40).

Dangers and problems

Pikeperch and perch stocks may begin to shrink in the coming years. As the entire Lake Peipsi fishery subsists on these species, this development will result in an adverse impact on local life. The continuing problem is the fragmented, excessive fishing capacity and the resulting large-scale fishing restrictions. It is possible that restrictions will have to be increasingly imposed in the first half-year. The current fisheries management therefore needs to be reformed to ensure that fishing will also be sustainable and economically viable in the future. While the financing received from the European Fisheries Fund has so far also been used to support fishing activities, either directly or indirectly, it would now be appropriate to abandon this course of action and start using the funds to balance the fishing capacity and fish stocks.

Figure 40.
Fish landings (t) at ports of Lakes Peipsi and Lämmijärv in 2012
Source: MoA



* Less than a tonne landed in each port. In descending order of importance: Vilusi, Vasknarva, Rootsiküla (Alatskivi rural municipality), Ranna (Ranna village), Kauksi, Laossina, Uusküla (Alajõe rural municipality), Soo, Piiroja, Sääritsa, Remniku Vanasadam and Kavastu.

Recreational fishing

The quantitative survey of recreational fishing conducted in 2011 and completed in 2012 revealed that fishing is a hobby that is gaining in popularity in Estonia. Also, the Recreational Fishing Development Plan provides for the promotion of this hobby. Namely, it is more useful for the country as a whole if citizens are healthy and spend their holidays and their money in their own country. Patriotism also enables the money to be channelled into more sustainable management of fish stocks and into the development of recreational fishing-related infrastructure.

Various campaigns, projects and TV and radio programmes designed for children and adults have contributed to an increase in popularity and awareness. Estonian people are gradually coming to an understanding that we live in a very diverse and species-rich country. To get a good catch one does not have to travel far abroad, but find a local body of water rich in fish and choose the right time and equipment for fishing.

Similarly to the survey of 2010, a quantitative survey of recreational fishing was also conducted in 2013. The survey was commissioned by the Ministry of the Environment and conducted from 14 June to 20 July by OÜ Eesti Uuringukeskus in collaboration with Norstat Eesti AS.

The survey was conducted in the form of personal interviews with recreational fishermen in six regions: Tallinn; North Estonia (Harju, Järva and Rapla counties); West Estonia (Lääne, Pärnu, Saare and Hiiu counties); the Tartu region (Jõgeva and Tartu counties); South Estonia (Põlva, Valga, Viljandi and Võru counties); and the Viru region (Lääne-Viru and Ida-Viru counties).

Since it was a repeat survey, it was based on the questionnaire that was used to collect the data of 2010. Estonian and Russian questionnaires were used and most of the questions were multiple choice.

Proportion and gender, age and socio-demographic distribution of recreational fishermen

In 2012, 28% of Estonian residents aged 15 and older engaged in recreational fishing (i.e. fished themselves or assisted in driving a boat or handling fishing gear). This result is 2% higher than in 2010. In total, there were around 306,000 recreational fishermen, up by 14,000 compared to 2010.

46% of those who did not fish had never engaged in fishing, but the remaining 54% pursued this hobby in earlier years. In 2010 the corresponding figures were 40% and 60%.

In 2012 the proportion of recreational fishermen was slightly above average in the Tartu region (39%) and slightly lower than average in Tallinn (20%). In 2010, there were more recreational fishermen in South Estonia and the Viru region (33% and 30%, respectively), as well as in Tallinn (21%).

Like in 2010, men prevail among recreational fishermen in Estonia.

Recreational fishermen's participation in fishing process and intensity of fishing

Around a quarter of those who engaged in fishing in 2012 can be considered occasional fishermen, going fishing once or twice a year. Compared to the data of 2010, the proportion of such fishermen has decreased by 9%. 39% of all recreational fishermen went fishing more than ten times in 2012 (27% in 2010).

The proportion of recreational fishermen who regard fishing as an important or the most important hobby they have grew from 22% in 2010 to almost a third (29%) in 2012. 90% of the fishermen usually fished themselves, while 10% had an assisting role in fishing (in 2010, 80% and 20%, respectively). A gender difference could be noted in the fishing process: a third of women and just 5% of men had a passive role. Women have become much more active compared to 2010: the proportion of passive fishing has decreased by 15%. More than half of recreational fishermen (57%) went fishing on up to ten days in 2012, compared to 64% in 2010.

Use of fishing gear

Spinning-rods are the main i.e. the most widely used fishing gear, which in 2010 were used by 45% and in 2012 by more than half (54%) of recreational fishermen. Spinning-rods were followed by hand lines and simple hand lines, which were used by 40% and 36% of recreational fishermen, respectively, as opposed to 36% and 37% in 2010. Hoopnets, dragnets and herring hooks were used the least (less than 1%). Gill net use differed from region to region and was more prevalent in West Estonia, as in 2010. Bottom lines were particularly actively used in the Tartu region.

Similarly to 2010, men prevailed in the use of spinning-rods in 2012 (61% vs. 26%), while more women than men used simple hand lines (42% vs. 35%). As in the previous survey, Estonians were more active in using gill nets than other nationalities (8% vs. 2%).

Intensity of using fishing grounds

In both 2010 and 2012, the most actively visited fishing areas of Estonia were smaller lakes and rivers, where around half of recreational fishermen have engaged in fishing, using the fishing gear specified in the survey. Using this fishing gear, a quarter of them had been fishing on Lake Peipsi and a fifth on the Emajõgi River. In 2010 these figures were 26% and 15%, respectively.

Lake Peipsi remained the most important fishing area for the inhabitants of the Viru region; the sea was the main fishing ground alongside rivers for people living in South Estonia. The Gulf of Riga, the Väinameri Sea and coastal regions towards the Baltic Proper near the islands stood out for an above-average proportion of fishermen. The clearly established favourite fishing grounds of the recreational fishermen from the Tartu region are the Emajõgi River and Lake Peipsi.

Catches of recreational fishermen

In 2012, 86% of those who went fishing at least once landed a catch. This figure is 6% higher than in 2010. Like in 2010, perch was the most common species caught (58%), followed by roach (43%) and pike (40%). Bream accounted for approxi-

mately 20% of the catch of recreational fishermen. All other fish species represented less than 10% of the catch. Using the fishing gear specified in the survey, recreational fishermen in Estonia caught a total of around 6000 tonnes of fish in 2012 (5300–7665 tonnes, taking into consideration confidence limits), or around 1000 tonnes more than in 2010. Perch and pike catches amounted to approximately 2000 tonnes, and the catch of roach was nearly 1500 tonnes. The quantities of other species were rather inaccurate (due to the low number of respondents).

In terms of fishing gear, the largest proportion of catches was taken using spinning-rods (around 2000 tonnes), followed by simple hand lines (around 1300 tonnes) and hand lines (around 1100 tonnes). Catches taken with playing hooks and bottom lines were also considerable (around 400 tonnes); the quantities caught with other fishing gear were much lower.

Looking at fishing grounds, substantial catches were estimated to have been taken from other rivers (2200 tonnes), Lake Peipsi (1300 tonnes) and other lakes (1000 tonnes). In 2012 recreational fishermen used 83% of their catch for human consumption, 4% of fish was given to animals and 13% was used in other ways (e.g. released back into water, brought to home ponds, used as fertiliser or given to friends).

Expenses incurred in recreational fishing

In 2012, 92% of those who had engaged in fishing incurred expenses in relation to recreational fishing. This figure increased by 18% compared to 2010. The recreational fishermen whose expenses ranged from 129–319 euros accounted for the largest share (17%) in 2012 (only 4% in 2010). On average, recreational fishermen estimated to have paid around 275 euros for their hobby in 2012, which is a significantly higher amount than in 2010 (109 euros).

The estimated total amount spent by recreational fishermen on fishing was 77 million euros in 2012.

The fee payable to the state for recreational fishing rights can be divided into two types, depending on the type of right acquired. The first is the standard charge for the right to recreationally fish using hooks and the second is the charge payable for a fishing card. The total amount of fees paid for recreational fishing rights in 2012 (0.775 million euros) is the highest in the years 2001–2012 (Table 30).

Table 30. Proceeds from commercial and recreational fishing charges (10^6 €), 2001–2012

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Commercial	Trawling	0.561	0.194	0.238	0.198	0.134	0.173	0.205	0.183	0.238	0.290	0.197	0.184
	Coastal fishery	0.458	0.384	0.419	0.409	0.300	0.332	0.224	0.314	0.353	0.318	0.373	0.355
	Distant-water fishery	0.415	0.283	0.497	0.383	0.358	0.268	0.288	0.463	0.408	0.231	0.170	0.216
	Total commercial fisheries	1.434	0.861	1.154	0.991	0.793	0.773	0.716	0.960	0.998	0.839	0.740	0.756
Recreational	Fishing card*				0.115	0.109	0.096	0.134	0.229	0.166	0.152	0.214	0.273
	Fee for fishing right**	0.176	0.187	0.217	0.198	0.224	0.281	0.288	0.288	0.377	0.364	0.360	0.502
	Total recreational fishing	0.176	0.187	0.217	0.313	0.332	0.377	0.422	0.516	0.543	0.516	0.574	0.775
	Total	**1.610**	**1.048**	**1.371**	**1.304**	**1.125**	**1.150**	**1.138**	**1.476**	**1.541**	**1.356**	**1.314**	**1.531**

* The data for 2004 still concern restricted fishing. There are no data on the receipt of fees before 2004
** Fishing card until 31 December 2004

Source: MoE

Aquaculture

Overview of sector

23 companies farmed fish and 21 companies farmed crayfish in 2012. According to the data of Statistics Estonia, 370 tonnes of production were sold. Based on the annual reports analysed during the preparation of the Aquaculture Development Strategy, freshwater aquaculture was the main or an ancillary activity for 42 companies and generated sales for 16 companies in 2011. The analysis of annual reports and the survey carried out among sole proprietors revealed that the sector's total sales (rounded) amounted to 1.1 million euros and the total loss was 0.2 million euros. The sales of the sector in 2012 were of the same order of magnitude.

Product diversification, i.e. cultivating more and more new species, is a new development. The cultivation of African catfish was successfully launched in Võru County, whitefish is farmed in Saaremaa, Arctic char has been cultivated in Lääne-Viru County for several years, and grass carp and silver carp are farmed as additional fish in Jõgeva County. There are three eel farms in Estonia – two new farms in Pärnu and Viljandi counties have started activities in addition to the oldest eel farm in Tartu County. A number of companies are set to farm sturgeons. All this has reduced the proportion of rainbow trout in the overall production volume. The exceptionally hot summer of 2010 devastated the sector to such an extent that the production volume has still not recovered. The newly founded fish farms based on reuse of water have not yet achieved the objectives set. Problems include limited experience in implementing the new type of technology, as well as mistakes made in designing and constructing facilities.

Data on the aquaculture sector are annually collected by Statistics Estonia. Discrepancies in the 'official' production figures have been brought up on many occasions. The reasons for this are discussed more thoroughly here.

1. The data on the quantities of fish farmed and sold have so far been collected separately; the quantities sold accounted for approximately 60% of the quantities farmed (long-term average). The volume of fish farming was recorded using the information provided by fish farmers. Since 2012, Statistics Estonia no longer collects or records the data on the quantities of fish farmed. Thus, our aquaculture production volume has become more comparable to that of other countries. However, there may be discrepancies between different years and documents.

2. Failure by fish farmers to respond to the surveys of Statistics Estonia distorts the data. The non-existence of eel production in 2012 is a clear example (Table 31).

Table 31. Estonian fish farming sales volume in tonnes, 2007–2012

	2007	2008	2009	2010	2011	2012
Eel	29.0	46.0	30.0	20.3	2.0	
Crayfish	1.3	0.7	2.0	0.4	0.6	0.1
Carp	27.5	52.3	45.4	39.4	37.5	38.2
Rainbow trout	413.5	333.8	549.0	487.5	333.8	245.3
Other fish	16.1	50.9	28.4	50.9	18.7	87.2
Total	**487.4**	**483.7**	**654.8**	**598.5**	**392.6**	**370.8**
Fish roe for human consumption	7.1	6.7	7.4	4.5	0.1	4.1

Source: Statistics Estonia

3. Different unit weights are used. According to well-established international practice, records are usually kept using the following unit weights:

- 'whole fish equivalent' (WFE), which is the prevailing unit characterising the volume of aquaculture;
- 'head on gutted' (HOG), which is commonly used in the production of salmon, where the fish is sold in gutted and chilled form (on ice);
- 'sold in product weight', which is preferred to describe volumes in the fish processing industry.

Using all three units in different parts of the value chain creates confusion. For example, Norwegian salmon is reported using 'head on gutted' as the unit weight. However, the unit used by Estonian fish farmers when giving their production figures is not clear.

Estonian Aquaculture Development Strategy 2014–2020

The preparation of an aquaculture development strategy for the next seven years was initiated by the Estonian Fish Farmers Association and it supported through the European Fisheries Fund. This is a genuine bottom-up initiative which originated directly from producers. The strategy was drafted by a joint working group of Tallinn University and the Estonian University of Life Sciences from October 2012 to August 2013. The aquaculture strategy serves as a basis for compiling the Operational Programme of the European Maritime and Fisheries Fund for the period 2014–2020 and will help companies operating in the aquaculture sector to devise their strategies and business plans.

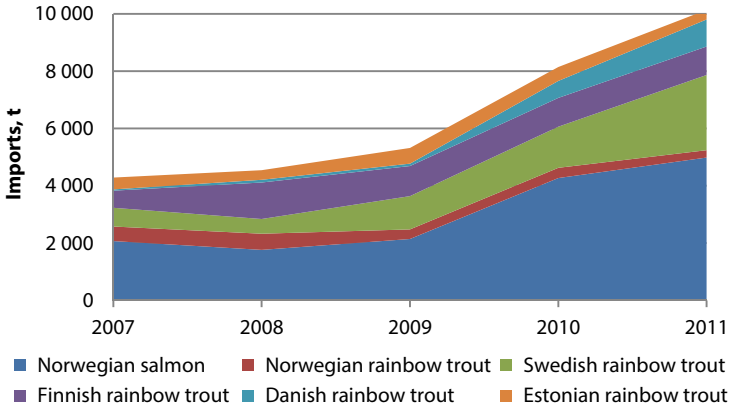
Representative organisations of the sector

In 2012, a new representative organisation – the Estonian Aquaculture Association – was founded. Members of the non-profit association include businesses engaged in aquaculture production.

The Estonian Fish Farmers Association, which also unites researchers, professionals and interested parties besides producers, changed its name. To indicate that the association also represents crayfish farmers, the new name is the Estonian Fish and Crayfish Farmers Association.

Ecofarm as a producer organisation of fish farmers is also continuing its activities.

Figure 41. Imports of salmonids from Norway, Denmark, Sweden and Finland (gutted, tonnes) in comparison with trout production farmed in Estonia
Source: Estonian Aquaculture Development Strategy 2014–2020



Production and sales

Besides fish farming, the marketing of farmed fish needs to be addressed. Major changes have occurred on the market in recent years.

- Commerce is increasingly being concentrated in larger retail chains and becoming their suppliers is vitally important to businesses. This requires a competitive price and quality, but also sufficient volume and consistency.
- The operating volumes of companies engaged in the processing of farmed fish have increased rapidly. For example, the production volume of OÜ Vettel is 4200 tonnes a year. The capacity of the new production facility of OÜ M.V. Wool, which was completed in 2010, is 4000 tonnes of salmon products. This growth is often described in negative terms, but in fact it offers new opportunities for Estonian aquaculture producers.

Looking at the import of our region's most important aquaculture goods – red-flesh salmon and trout – it appears that there has been a sharp increase since 2009. At the same time, the volume of domestic production has rather decreased (Figure 41). There are a variety of reasons for this, such as failure to be partners to very large wholesalers. Production has been affected by several unfavourable years when there were no big fish to sell.

Fish restocking

The cultivation of juvenile fish for restocking purposes was widespread among Estonian fish farmers until 2007. Juveniles of salmon, sea trout, brown trout, whitefish, pike, pikeperch, tench and carp were farmed, and elvers and eel fingerlings were introduced into water bodies. Sales of crayfish juveniles for natural water bodies was spreading.

By 2012, the situation had changed considerably. The range of main species farmed for restocking was limited to salmon, sea trout and eel. 867,000 eel fingerlings and 100,000 farmed eels were released into water bodies. One-summer-old (100,000), one-year-old (80,000) and two-year-old (53,000) salmons were introduced into rivers in the Gulf of Finland basin. 38,000 one-year-old and 27,000 one-summer-old sea trouts were introduced into water bodies; two-year-old sea trouts (12,000) were only released into the Pudisoo River. Asp, a protected spe-

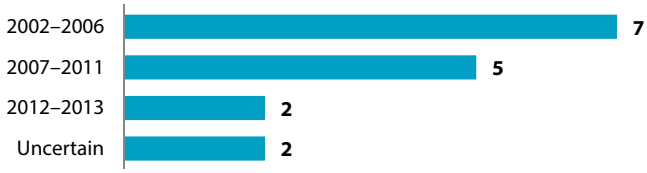


Figure 42. Companies providing fishing tourism services by starting year
Source: EULS

cies, is now being introduced into the Emajõgi River (13,000 one-summer-olds), which was not done a couple of years ago. This activity is supported by the state. Salmon and sea trout were farmed at the state-owned Põlula Fish Farming Centre; sea trout was also farmed at a privately owned juvenile fish farm. Very small amounts of other fish species and crayfish have been introduced based on private initiatives.

Put-and-take fishing (fishing tourism)

One of the three branches of aquaculture in Estonia is fishing tourism, where customers are offered the opportunity to catch fish from fish farm ponds (put-and-take fishing). In 2012 there were 28 companies offering such a service in Estonia. The number of fishing tourism start-ups was much higher during the years 1997–2011 than in 2012 and 2013 (Figure 42). In most cases, put-and-take fishing is an ancillary activity among other tourism services offered at tourism resorts or on tourism farms. Fishing tourism is the main activity of six companies, whose names include the word 'trout'. Put-and-take fishing as an additional service is also offered on four fish farms.

Problems related to the use of the environment

In 2012 the Ministry of the Environment commissioned a study on the pollution load of aquaculture. The study, titled 'Development of methodology for calculating water pollution from fish farming', was conducted by OÜ Aqua Consult Baltic (2013). Its aim were to ascertain the pollution load resulting from fish farming in Estonia, to compare it with that of other sectors, to describe the methods used by other EU Member States to assess the pollution load and to develop a suitable methodology for Estonian conditions.

The study provides an overview of Estonian fish farms in 2012, the types of technology used on the farms and the production volumes of the farms. The regulation of fish farming and taxation in other EU Member States is also analysed. The study also evaluates possible options of limiting pollution under Helcom Recommendation 25/4, which discusses the pollution load of fish farms.

The study concludes with proposals for the technological classification of fish farms according to pollution caused to the aqueous environment. They provide the basis for addressing and possible taxation of the pollution load.

Those who want to engage in aquaculture using net cages currently face the problem of the right of superficies. An aquaculture company that wants to start

farming fish in net cages in the sea must deal with a legal bottleneck – in order to place cages in a water body (sea) it must obtain a permit for special use of water and a building permit from the local government. The latter is subject to the consent of the land owner who, in the case of the seabed, is the state (i.e. the Government of the Republic). Proceedings concerning permits for special use of water last for three months. Thus, obtaining a permit for special use of water is not a problem. However, proceedings concerning the right to use net cages essentially amount to an administrative procedure that is as lengthy as in the case of construction of a new large port. Proceedings lasting for more than a year exclude investors' interest because it is not known when the investment will be able to commence.

Research and development

The Estonian University of Life Sciences continues to educate fish farmers at the Master's level. In 2012 four Master's theses and one Doctoral thesis were defended which discussed changes caused by the skin diseases of fish. Ongoing research concerns the genetics of fish and crustaceans, reproduction of fish stocks, and crayfish stock assessment; fish disease control is supported by advice and analyses.

The first course of fish farming studies was opened at Järva County Vocational Training Centre in 2012. Future fish farmers are taught in Särevere; the course lasts for one year.

Estonian fish processing industry

General overview of sector

According to the data entered in the Commercial Register, there were 61 companies in Estonia in 2012 (55 in 2011) whose main business comprised the processing and canning of fish, crustaceans and molluscs. Based on the Commission Recommendation (2003/361/EC)[3], 85% of them were small enterprises, as their average number of employees was up to 49. The number of microenterprises increased from 26 in 2011 to 31 in 2012. The number of large enterprises engaged in fish processing increased by one in 2012. A more detailed overview of the groups of companies is presented in Figure 43.

On average, fish processing companies employed a total of 1816 people[4] ; most of them (60%) were women. Looking at the age structure of the companies, 40 (66%) of the 61 companies operating in 2012 were more than ten years old. In 2012, the total sales revenue of the companies amounted to 143 million euros, with processing and canning of fish, crustaceans and molluscs accounting for 87% of the revenue, i.e. 125 million euros. Processing and canning of fish, crustaceans and molluscs was an auxiliary activity for 11 companies. Their sales revenue from this segment amounted to 4.7 million euros.

The processing facilities of fish processing companies were mainly located in Harju and Pärnu counties: 20 processing facilities of the total 76 were operating in each county (Table 32).

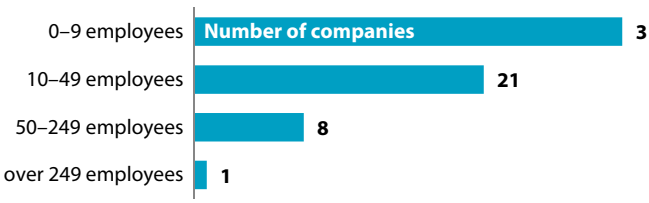


Figure 43. Number of companies whose main business comprised processing and canning of fish, crustaceans and molluscs based on average number of employees in 2012.
Source: Commercial Register

Table 32. Number of processing units of fish processing companies in 2012 by county

County	Number of processing units
Harju	20
Pärnu	20
Saare	9
Ida-Viru	9
Tartu	6
Jõgeva	3
Hiiu	3
Lääne-Viru	3
Lääne	2
Järva	1
Total	**76**

Source: Commercial Register, Veterinary and Food Board

[3] Commission Recommendation (2003/361/EC) divides companies into four groups based on the number of employees: 1) microenterprises – 0 to 9 employees; small enterprises – 10 to 49 employees; medium-sized enterprises – 50 to 249 employees; large enterprises – 250 or more employees

[4] Average number of full-time employees (full-time equivalent)

Basic and economic indicators and trends of companies whose main business is fish processing

2012 was characterised by intensified competition and price increases in both raw materials and end production. Compared to 2011 the number of fish processing companies grew somewhat, and total sales revenue increased by 10% (Table 33), while the number of employees did not change significantly. The average annual wage cost per employee was 7620 euros in 2012, which was 8% more than in the preceding year.

Of the 61 fish processing companies, 18 (30%) closed the financial year 2012 with a loss. The total net profit was 4.3 million euros and the total value added amounted to 24 million euros. The combined assets of fish processing companies amounted to 89.2 million euros in 2012, with fixed assets accounting for 51% (45.8 million euros). Investments placed in fixed assets during the year amounted to 3.8 million euros, which is 61% less than in the preceding year. The debt ratio, which shows the share of debt (liabilities) in the funding of the assets of companies, remained at the same level as the year before (51%).

The operating expenses of fish processing companies totalled 137.8 million euros in 2012.

Raw materials and supplies accounted for the largest proportion (67%) of expenses; this increased in comparison with 2011 due to price increases of raw and auxiliary materials. The proportions of labour and energy costs in operating expenses were 14% and 3%, respectively (Figure 44).

If we compare the basic and economic indicators in the different size classes of fish processing companies (Table 34), it appears that almost 60% of the total sales revenue of the fish processing industry in 2012 came from eight medium-sized companies, which accounted for just 13% of the total number of compa-

Table 33. Basic and economic indicators of companies whose main business is fish processing, 2007–2012

	2007	2008	2009	2010	2011	2012
Number of companies	57	59	56	53	55	61
Total sales revenue, 10^6 €	99	124	110	111	130	143
Average number of employees	2097	2101	1822	1860	1813	1816
Average annual wage cost per employee, €	6221	6909	6447	6393	7029	7620
Gross value added, 10^6 €	17.7	25.2	22.9	20.9	18.3	24
Investments in fixed assets, 10^6 €	6.3	7.7	5.4	10.6	9.7	3.8
Debt ratio,%	55	54	53	49	50	51

Sources: Statistics Estonia, Commercial Register

Table 34. Basic and economic indicators in different size classes of fish processing companies in 2012

Size class, number of employees	Number of companies	Sales revenue, 10^6 €	Average number of employees	Average annual wage cost per employee, €	Fixed assets, 10^6 €	Investments in fixed assets, 10^6 €	Gross value added, 10^6 €	Debt ratio, %
0–9	31	7.5	109	5990	4.6	0.5	1.2	32
10–49	21	42.9	534	7748	17.2	0.8	6.2	47
50–249	8	85.1	907	8403	23	2.9	14.4	57
Over 249	1	7.6	266	5363	1	0.07	2.2	54

Source: Commercial Register

nies. This size class also employs the highest number of people (50% of the total number of employees) and has the highest wage costs per employee. In addition, this size class invested the most in fixed assets and produced 59% of gross value added. Based on the debt ratio, however, medium-sized enterprises were characterised by the highest risk level. The total operating expenses of fish processing companies (137.8 million euros) were divided as follows in 2012: microenterprises – 7.1 million euros; small enterprises – 42.2 million euros; medium-sized enterprises – 81 million euros; and large enterprises – 7.4 million euros. The distribution of operating expenses was similar in these size classes (Figure 45), but a higher proportion of costs of raw materials and supplies in medium-sized enterprises and a higher proportion of energy and labour costs in enterprises employing more than 249 people can be observed.

Production and sales

The production of the Estonian fish processing industry amounted to 71,400 tonnes in 2012. Frozen, salted, spiced, dried, deep-frozen and breaded fish accounted for the bulk of production (Table 35).

Compared to 2011, when the production of the Estonian fish processing industry dropped to its lowest level in ten years, it increased by 21.4% in 2012. This growth can primarily be attributed to the sales of frozen fish (sprat and herring). Although the sprat and herring quota of the Estonian trawl fleet decreased in 2012, the quantity of raw material increased at the expense of the Finnish quota. Because of reduced fishing quotas and a lack of raw material, a number of Estonian fishing companies bought Finnish trawling companies to acquire fresh fish. Thus, some of the Finnish quota was landed in Estonia. According to import statistics, the quantity of fresh or chilled fish imported from Finland increased by

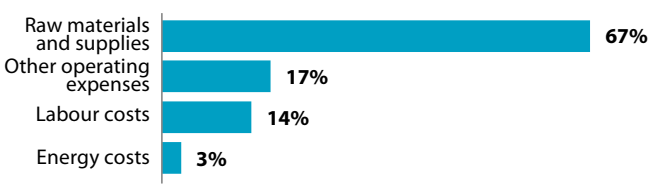


Figure 44. Proportions (%) of operating expenses of companies whose main business is fish processing, 2012
Source: Commercial Register

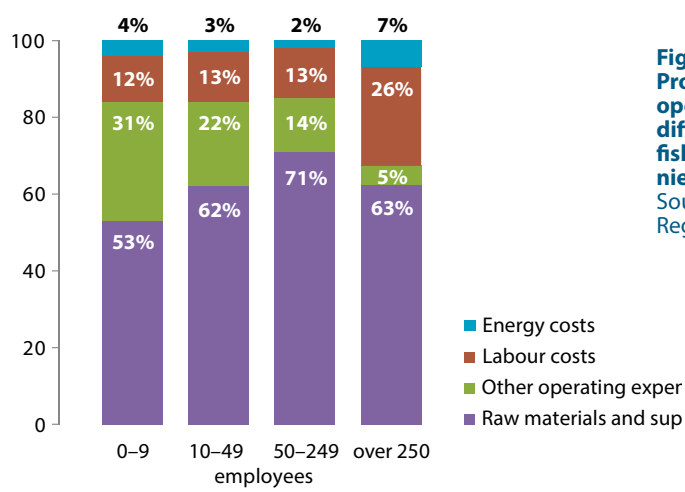


Figure 45. Proportions (%) of operating expenses in different size classes of fish processing companies in 2012
Source: Commercial Register

Table 35. Production (10^3 t) of Estonian fish processing industry by product type, 2007–2012

Fishery products	2007	2008	2009	2010	2011	2012
Fresh and chilled fish meat, fish fillets and minced fish meat	3.5	3.3	4.1	3.7	2.5	2.6
Frozen fish	36.5	30.3	34.6	35.5	32.8	44
Smoked fish	3.6	3.8	3.2	1.4	1.9	2.3
Salted, spiced, dried, deep-frozen and breaded fish	24.4	20.8	25.1	19.8	16.5	14.1
Culinary fishery products in oil, marinade or sauce	2.9	1.5	1.7	1.5	1.3	4.7
Fish preserves	5.1	7.1	3.7	5.1	3.8	3.7
Total	**76.0**	**66.8**	**72.4**	**67.0**	**58.8**	**71.4**

Source: Statistics Estonia

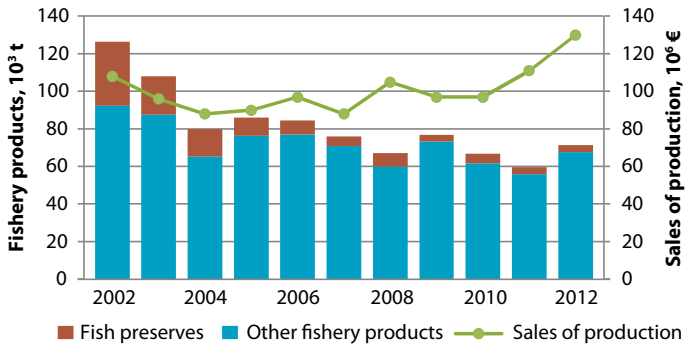


Figure 46. Dynamics of production and sales revenue of fish processing industry, 2002–2012
Source: Statistics Estonia

around four times in 2012 (from 4775 tonnes in 2011 to 17,728 tonnes in 2012). The sales revenue of the fish processing industry amounted to around 130 million euros in 2012, which was 17% higher than in the preceding year. Although the production volume has generally decreased compared to ten years ago, the value of the production sold has increased, which can be explained by the increase in the price of the production (Figure 46).

The proportion of exports in sales accounted for around 73% in 2012 (Table 36), which indicates the high dependence of the Estonian fish processing industry on exports. Table 37 sets out the top ten countries in exports and imports of fish and fishery products. The table shows that exports of fishery products to the main export countries – Russia (36,790 tonnes in 2011) and Ukraine (27,940 tonnes in 2011) – increased in 2012. While Latvia was the main import country in 2011 (11,540 tonnes), Finland placed first in 2012 (5980 tonnes in 2011). Table 38 contains data on exports by type of production and source of raw material. All four types of production were also represented on the local market. Occasional problems occurring in sales of production on the eastern market have made many companies oriented towards that market more cautious. Therefore, efforts are being made to find additional markets so as to diversify risks.

Aid granted to fish processing industry

In 2012, fish processing companies and producer organisations received fisheries aid to a total value of 4.3 million euros (Table 39) – approximately three million euros (41%) less than in 2011. It was mostly aid intended for investments in processing and marketing of fish that decreased.

Table 36. Domestic sales and exports of production of fish processing companies, 2007–2012

	2007	2008	2009	2010	2011	2012
Total sales, 10^6 €	88	105	97	111	129	143
Domestic market, 10^6 €	24	27	25	30	30	39
Exports, 10^6 €	64	78	72	81	99	104
Proportion of exports (%)	73	74	74	73	76	73

Sources: Statistics Estonia, Commercial Register

Table 37. Top ten countries in exports and imports of fish and fishery products in 2012. In addition to local production, the table includes all the fish and fishery products that passed through Estonia.

Exports in tonnes				Imports in tonnes			
Russia	40 666	Iceland	3 813	Finland	20 452	Morocco	1 983
Ukraine	28 594	Kazakhstan	3 377	Latvia	11 147	Germany	1 556
Latvia	6 902	Moldova	2 955	Lithuania	5 782	USA	1 390
Belarus	6 115	Spain	2 790	Sweden	3 979	Norway	1 288
Finland	3 844	Germany	2 406	Denmark	3 697	Spain	1 132

Source: Statistics Estonia

Table 38. Estonian fish processing companies by type of production, source of raw material and main foreign market

Type of production	Source of raw material	Main foreign market
Frozen fish	Baltic sprat and herring	Eastern market (Russia, Ukraine, Belarus etc.)
Fillets and culinary products	Imported and local fish	Western market (Switzerland, Germany, Denmark, Finland, Sweden etc.)
Fast food	Imported raw material	Eastern and western markets (Lithuania, Serbia, Finland, the Czech Republic etc.)
Canned products	Fish from the Baltic Sea and oceans	Eastern market (Russia, Ukraine, Kazakhstan, the Czech Republic etc.)

Source: Commercial Register

Table 39. Fisheries aid granted to fish processing companies, 2010–2012

Aid	Purpose	Amount paid, €		
		2010	2011	2012
Investments in processing and marketing of fish (measure 2.3)	To develop and modernise the processing of fishery products or aquatic plants	1 976 605	4 447 864	1 520 452
Collective investments by producer organisations (measure 3.1.1)	To improve the quality of fishery products and increase year-round stability of supplies through the development of producer organisations	4 720 747	2 403 369	2 042 948
Development of new markets and promotional campaigns (measure 3.4)	To promote the consumption of fishery products and new products and find new market outlets for fishery and aquaculture products	437 688	444 073	662 238
Practical training support for producers or processors of fishery products	To partially compensate producers or processors of fishery products for the costs of practical training of students in fisheries-related disciplines, which is arranged in the enterprises of the producers or processors	32 170	30 452	24 250
Training support for producers or processors of fishery products	To compensate producers or processors of fishery products for the costs of training of the producers or processors or their employees	4 990	9 354	3 278
Support for commencing the activities of an association of producers of fishery products	To partially compensate the association of producers of fishery products for foundation and administrative expenses relating to the commencement of activities			7 430

Source: ARIB

Grants

14 measures are being implemented under the Estonian Operational Programme of the European Fisheries Fund (EFF):

Measure 1.1	Public aid for permanent cessation of fishing activities
Measure 1.3	Investments on board fishing vessels and selectivity
Measure 1.4	Small-scale coastal fishing
Measure 1.5	Socio-economic measures
Measure 2.1	Investment support for aquaculture
Measure 2.2	Support for inland fisheries
Measure 2.3	Investments in processing and marketing
Measure 3.1.1	Collective actions, 'Collective investments' action
Measure 3.1.2	Collective actions, 'Other collective actions' action
Measure 3.2	Protection and development of aquatic flora and fauna
Measure 3.4	Development of new markets and promotional campaigns
Measure 3.5	Pilot projects
Measure 4.1.1	Sustainable development of fisheries areas
Measure 5.1	Technical assistance

Measures 1.3, 1.4, 2.2, 3.1–3.5, 4.1 and 5.1 are being funded under the Minister of Agriculture Regulation No 8 of 24 January 2012, 'Measures and types of action supported in 2012 under the Operational Programme of the European Fisheries Fund 2007-2013'.

Aid has been granted under the EFF measures in Estonia since 2008 when 13 projects were supported. In 2009 aid was granted to 183 projects; in 2010 to 202 projects; in 2011 to 253 projects; and in 2012 to 337 projects. In terms of distribution between counties, the largest share of aid was granted to Harju, Pärnu, Lääne-Viru and Viljandi counties in 2012. By 30 September 2013 the highest payouts had been made for projects carried out in Pärnu, Harju and Saare counties (Figure 47).

In 2012, aid was granted through the following measures:

1. **Through measure 1.3** aid was granted for e.g. acquisition and installation of equipment on a fishing vessel (technical equipping); construction of an ammonia system in place of a freon system; acquisition of auxiliary devices, such as a diesel-electric generator, a metal detector and an infrared camera; hull repairs, and repairs and replacement of equipment; modernisation of a fishing vessel; acquisition and installation of survival and navigation equipment on a fishing vessel, incl. software acquisition and installation; improvement of working conditions on board a vessel; acquisition of a searchlight; reconstruction of a fishing vessel's equipment and main engine.

Aid in the total amount of 854,155 euros was granted to 20 projects; 300,499 euros has been paid out.

2. **Through measure 1.4** aid was granted for e.g. modernisation of a fishing vessel; acquisition of an engine for a fishing vessel; hull repairs, reconstruction of superstructure and fish preservation room; acquisition of seal-proof fishing gear; acquisition/replacement of more selective fishing gear (pelagic, fyke and pound nets); acquisition of an engine for a fishing vessel; renovation of a motorboat; carrying out hull work, acquisition and installation of survival and navigation equipment; making the fishing gear of a fishing vessel more selective and acquisition of modern equipment.

Aid in the total amount of 583,126 euros was granted to 55 projects; 436,565 euros has been paid out.

3. **Through measure 2.1** aid was granted for e.g. establishment of a rainbow trout farm; reconstruction of trout farming facilities, reconstruction of a fish farm and expansion of a whitefish farm.

Aid in the total amount of 1,897,455 euros was granted to four projects; no payments have been made yet.

4. **Through measure 2.2** aid was granted for e.g. acquisition of survival equipment (life jackets) and acquisition and installation of means of communication, navigation equipment, selective fishing gear (trap nets) and a new engine; acquisition of a selective trap net; acquisition of a two-bag trap net for catching freshwater fish; modernisation of a fishing vessel; acquisition and finance lease of selective fishing gear, and acquisition of fishing gear.

Aid in the total amount of 824,856 euros was granted to 60 projects; 250,821 euros has been paid out.

5. **Through measure 3.1.2** aid was granted for e.g. improving food quality and safety; studying the possibilities of improving the condition and quality of the spawning areas of migratory freshwater fish in Väinameri Sea and the northern part of the Gulf of Riga; fisheries research using a trawler and a seiner; aquaculture study and test base (Järva County Vocational Training Centre); Estonia's fisheries display at Grüne Woche in 2013, and drafting the Estonian Aquaculture Development Strategy.

Aid in the total amount of 1,812,647 euros was granted to six projects; 85,480 euros has been paid out.

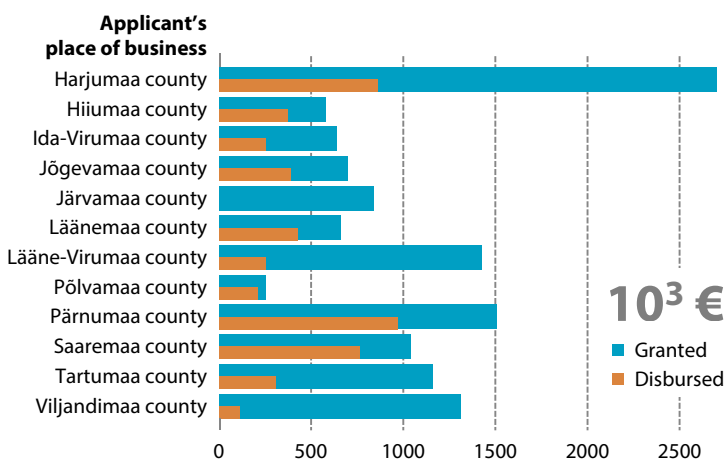


Figure 47. Aid granted and disbursed in 2012 (10^3 €) as at 30 September 2013
Source: MoA

6. **Through measure 3.4** aid was granted for e.g. participation in a trade fair or exhibition.

Aid in the total amount of 600,000 euros was granted to five projects; 466,999 euros has been paid out.

7. **Through measure 4.1.1** aid was granted for e.g. construction and renovation of a holiday home necessary for servicing tourists; a port development project; a project intended to arouse young people's interest in the sea; a historic rowing boat; acquisition of a lumber trailer with crane and a snow plough; renovation of cold storage; construction of quay lighting systems and installation of fenders at a fishing port; dredging a port basin; external training in Switzerland; creating a single website for a fishery region; acquisition of electronic waterproof scales, a chiller necessary for fish storage, a barbecue shelter of handcrafted logs, and roofed and roofless log benches; acquisition of a mobile smoked fish sales kiosk and equipment; acquisition of a CNC processing centre; acquisition of a maintenance mower, front-loader, scoop, silage fork and hay roll fork; acquisition of maintenance equipment; conducting a skipper course; acquisition of a cold-storage truck; repairs of fish processing facilities; acquisition of technological equipment and a wastewater tank; acquisition of a firewood splitting machine, chain saw and mower; construction and renovation of a building necessary for processing fishery and aquaculture products; exchanging experiences concerning examples of LEADER fishery projects in Europe; acquisition of a portable smoke oven; construction of commercial fish pre-treatment facilities; acquisition of a rowing boat and survival equipment; construction of a ship-shaped terrace for servicing tourists; construction of a port café and children's playground, and acquisition of rowing boats; acquisition of apiculture supplies and construction of an auxiliary building; acquisition of a flake ice maker and cleaning machine; a port's petrol station; acquisition of equipment for seminar and kitchen facilities of a holiday resort; stage I of a fish processing centre; kayaking safety training; diversification of coastal fishery opportunities based on the example of Italy; development of fishing tourism; stage II of development of fishing tourism by an action group; construction of a holiday home on a tourism farm; acquisition of a rowing boat and boat trolley; development of fishery-related tourism and revival of a coastal village; improving opportunities for direct marketing of fish; coastal fishermen training programme; product development; acquisition of snow removal equipment for road maintenance work; connecting a building to the power supply system; acquisition of port dredging equipment; development of visitor centres/tourism farms; construction of fish receipt and storage facilities and acquisition of heat pumps; further development of a recreation area; construction of stage II of a port development project; acquisition of a trailed sales kiosk and showcases; acquisition of an engine for a historic rowing boat; stage I of reconstructing an inn building; acquisition of a fishing raft/floating sauna; stage I of arranging a port area; marketing training for small businesses; reconstruction of the building of a farm providing accommodation services; establishing washing and camping sites; stage III of constructing a building for first receipt and cooling of fish at a port; reconstruction of boathouses and a non-work building for fishermen, and acquisition of a safety post; development of a holiday home; training in aquaculture; fishing tourism equipment; acquisition of equipment for the service building of a holiday resort; acquisition of equipment

necessary for direct marketing of fish; conducting project training for people employed in the fisheries sector; reconstruction of a boat harbour; participation in an international cooperation project; revival of a coastal village and promotion of fishery traditions; acquisition and installation of a quick-freezing cold room; stage II of reconstructing a (fish) port; acquisition of a sewage tank for a service establishment; acquisition of a lawn tractor and brush cutter; acquisition of a van; acquisition of industrial equipment; acquisition of kayak sets and a trolley; acquisition of a hot smoke oven; acquisition of sail boats and a boat holder; modernisation of a port; acquisition of equipment for processing fish and fishery products; acquisition of watercraft for ports; construction of an outdoor kitchen; organising a training day at a port; acquisition of thermo-boxes; acquisition of a cold-water pressure washer; organising an event promoting fishery traditions; acquisition of a band saw machine; a study trip for fishing tourism marketing purposes; construction of a fish drying building; acquisition of a vacuum packaging machine and scales; acquisition of a confectionery stall and signposts; acquisition of a refrigerator; acquisition and installation of kitchen equipment for a holiday resort; reconstruction of a service building as a workshop and acquisition of woodworking equipment; stage III of renovating quays; acquisition of a mobile sawmill; acquisition of equipment necessary for unloading and storage; conducting training; hydrotechnical facilities of a port; acquisition of a two-axle isothermal sales trailer with brakes; training for small businesses on direct marketing of fishery products in a fishery region; acquisition and installation of navigational marking; development of coastal life; acquisition of a stainless smoke oven; acquisition of a kitchen mixer and a TV screen; improving the product quality of fish caught; acquisition of cleaning equipment; partial renewal of a port's technical utility systems – acquisition and installation of a video surveillance system; acquisition of a landing-stage; acquisition of a cooling container; restoration of a mole quay and clearing a port's basin of sediments; acquisition and installation of a stationary heating unit (for a port building); issuing various printed materials; acquisition of a van with an isothermal refrigeration unit for transportation of fish; acquisition of a descaling device; acquisition of a freezer chest; acquisition of mosquito catchers for a holiday resort; designing and construction of a fish processing facility; acquisition of a landing-stage and module tent for a holiday home, and establishment/maintenance of a fire-fighting water extraction point; acquisition and renovation of a historic sailboat; construction of a sauna and terrace, preparation of the website and designing the logo of a holiday resort; construction/renovation of a fishing gear building at a port; acquisition of ATV accessories; and stage II of constructing a port.

Aid in the total amount of 5,724,869 euros was granted to 187 projects; 3,362,893 euros has been paid out.

In addition to the EFF aid, state subsidies in the total amount of 501,579.60 euros were granted to the fisheries sector on 16 occasions and support from the fund of common market organisation for fishery and aquaculture products was granted in the total amount of 26,022,204.69 euros on four occasions in 2012.

Ichthyologic and fishery-related research projects

The following is an overview of ichthyologic and fishery-related projects carried out in Estonia in 2012. The list is not exhaustive, as some comprehensive projects, for example, may contain smaller-scale studies related to fish. Nor does the list include the research topics of graduate students. More information about the studies is available on the internet and in the publication *Aastatel 2008–2013 valminud kalandusuuringud* /Fisheries research carried out from 2008–2013/ issued by the Fisheries Information Centre.

Analysis of the fishing capacity of Estonia's trawl fleet on the Baltic Sea

Tallinn 2012
Commissioned by: Ministry of Agriculture
Carried out by: UT EMI
Funded by: European Fisheries Fund through ARIB

The aim of this study was to provide an overview of the fishing capacity of the trawl fleet on the Baltic Sea (segment 4S1 – vessels whose overall length is 12 m or more and used on the Baltic Sea) and the utilisation of fishing capacity in 2011, and to determine the optimal fishing capacity of the trawl fleet, taking into account the available fishing opportunities. Another goal was to analyse whether the decommissioning of vessels and the resulting reduction in the total capacity indicators of the fleet would be acceptable from a technical point of view.

Recognised and notified fish processing companies that produce smoked fish in Estonia

Pärnu 2012
Commissioned by: NGO Gulf of Finland Fisheries Association
Carried out by: Fisheries Information Centre of UT EMI
Funded by: European Fisheries Fund through ARIB

This study aimed to ascertain the share of production of smoked fish among recognised and notified fish processing companies in Estonia, to determine the preparedness of fish processing companies to produce smoked fish and to identify the training needs of producers.

Assessment of recreational fishing capacity on the Emajõgi River

Tartu 2012
Commissioned by: Environmental Board
Carried out by: NGO South-Estonian Fishermen Club
Funded by: EIC

This study aimed to assess the impact of recreational fishing in the Emajõgi River compared to other fishing methods. The results obtained enable the assessment of the proportion of Emajõgi River fishery that recreational fishing accounts for.

Hydrobiological monitoring of rivers

Tartu 2012
Commissioned by: Ministry of the Environment
Carried out by: Limnology Centre of EULS IAE
Funded by: Ministry of the Environment

This study report sets out the results of work carried out in 2011 under the 'Hydrobiological monitoring of rivers' sub-programme of the national environmental monitoring programme. In 2011, primarily the bodies of water located on Estonian islands (Saaremaa and Hiiumaa) and in the sub-basin of Lake Peipsi were studied. Some river sections in other regions of Estonia were also examined. Monitoring studies were performed in the following watercourses: Piusa, Võhandu, Iskna, Mädajõgi, Tänassilma, Ärma, Leie, Pedja, Pikknurme, Umbusi, Põltsamaa, Preedi, Oostriku, Nõmavere, Kavilda, Amme, Mudajõgi, Mõra, Leevi, Lutsu, Kääpa, Mustvee, Piilsi, Avijõgi, Kauksi, Alajõgi, Esna, Vaemla, Luguse, Vanajõgi, Armioja, Nuutri, Suuremõisa, Põduste, Irase, Vesiku, Pidula, Tirtsi, Punapea, Leisi, Võlupe, Kuke and Lõve – a total of approximately 70 monitoring sections. During the study, the rivers' physicochemical and hydromorphological properties and biota components (benthic diatoms, phytoplankton, large vegetation, benthic fauna and fish) were determined and measured. The biota components served as the basis for assessing the condition of the water bodies.

Fish restocking studies

Tartu 2012
Commissioned by: Ministry of the Environment
Carried out by: Aquaculture Department of EULS IVA
Funded by: EIC

This report for 2011 forms part of long-term cooperation that was launched in 1995 between the Aquaculture Department of the EULS IVA, the Ministry of the Environment and the Põlula Fish Farming Centre. The co-operation aims to analyse the restocking of water bodies through fish farming in Estonia, incl. monitoring the diversity of fish populations on the basis of the results of salmon and sea trout introductions, especially the impact on the genetic structure of fish populations. The practical output of the work comprises recommendations to the Fisheries Department of the Ministry of the Environment Department, to the Environmental Board and to the Põlula Fish Farming Centre for the organisation of the production of fish for restocking.

Study of fish and fishing gear efficiency in Estonian small lakes

Tartu 2012
Commissioned by: Ministry of the Environment
Carried out by: Limnology Centre of EULS IAE
Funded by: EIC

This study summarises the results of 2012 on the bodies of water studied from spring to autumn. The state of fish stocks and potential changes in the stocks over the next three years are examined. The aim is to seek solutions and to discuss how different types of fishing gear could be optimally used in exploiting fish stocks. Attention is focused on key species, such as pike, perch, bream and pikeperch, as well as tench and roach.

Studies of fish stocks in Lakes Peipsi, Lämmijärv and Pskov

Tallinn 2012
Commissioned by: Ministry of the Environment
Carried out by: UT EMI
Funded by: EIC

This study report analysed fishing efforts and the condition of fish stocks in 2011, the causes of formation of fish stocks and prospects for the near future. Based on the condition of fish stocks, recommendations for fishing quotas and the fishing regime in 2012 were developed.

Temporal-spatial dynamics of the spread of fish larvae in Pärnu Bay and advice for sustainable management

Pärnu 2012
Commissioned by: Urmas Margus, sole proprietor
Carried out by: UT EMI

This study, completed in 2012, presents an overview of long-term and seasonal changes in fish larvae abundance in Pärnu Bay; maps the spatial distribution of fish larvae in Pärnu Bay in recent decades by month, covering May, June and July; analyses the variability of the temporal-spatial distribution of fish larvae abundance by week, covering May, June and July; and provides scientific advice for the sustainable management of fish stocks in the bay. In terms of species, the study addresses the larvae of herring and goby, because the abundance of the larvae of other fish species was low or the location of sampling points did not enable sufficiently representative material to be collected on them.

Fish fauna in the marine environment around Kõpu peninsula

Tartu 2012
Commissioned by: Estonian Fund for Nature
Carried out by: UT EMI
Funded by: EIC

This study aimed to provide an overview of the fish fauna in the marine environment around Kõpu peninsula and of the importance of the region from the point of view of fishery. The project also analysed how anthropogenic and other factors may threaten the fish fauna in the region described.

Assessment of the reproductive potential of sea trout spawning rivers, 2011

Tartu 2012
Commissioned by: Ministry of the Environment
Carried out by: Limnology Centre of EULS IAE, UT EMI, NGO Trulling
Funded by: EIC

The long-term study of sea trout rivers which began in 2007 continued. The study aims to provide an updated and comprehensive overview of the situation of sea trout in Estonian rivers. The study promotes sustainable management of sea trout rivers and helps design measures to improve the condition of sea trout. The report discusses observations made in 2010 and 2011 on four watercourses in North-West Estonia, 12 watercourses on Hiiumaa and 14 watercourses on Saaremaa.

Coastal lagoons in Estonia and in the Central Baltic Sea region. Part IV 'Results of studies of coastal lagoons'

2012
Carried out by (research of fish fauna): Limnology Centre of EULS IAE
Funded by: EU Central Baltic INTERREG IV A Programme

The overall objective of the 'NATURESHIP – Integrated Planning and Management in the Baltic Sea Region' project was to promote cooperation in the fields of management of the environment, nature and water conservation in Finland, Sweden and Estonia. The purpose of the project was to develop plans for the use of coastal areas in accordance with the principles of sustainable development. Issues relating to coastal lagoons were chosen as one of the cooperation topics.

The aim was to gather existing information on the coastal lagoons and to collect new data in order to assess the value of these habitats in terms of nature conservation, examine the factors that impact their environmental status and provide knowledge-based recommendations for the organisation of the protection and use of coastal lagoons. A publication entitled 'Coastal lagoons in Estonia and in the Central Baltic Sea region' was prepared as a result of the project in collaboration with the Pärnu College of the University of Tartu, the Hiiu-Lääne-Saare Region of the Environmental Board, the Limnology Centre of the Estonian University of Life Sciences and other partners.

Implementation of the national fisheries data collection programme

Commissioned by: Ministry of the Environment
Carried out by: UT EMI
Funded by: EIC

This annual study involves the collection of fisheries data in accordance with Council Regulations (EC) No 199/2008 and 812/2004, Commission Regulations (EC) No 665/2008 and 1078/2008 and Commission Decision 949/2008/EC, analysis of the data and making recommendations for the management of fish stocks.

Identifying the competencies and skills of the workforce and labour market needs in the fisheries sector

2012
Commissioned by: Ministry of Agriculture
Carried out by: OÜ Eesti Uuringukeskus
Funded by: European Fisheries Fund

The aim of this study, carried out in 2011, was to identify the educational level of workforce used in the fisheries sector (in the sub-sectors of fishing, fish farming and processing, manufacture of fishing gear, fish trade, state agencies and supervisory authorities), the number of people needed in the sector and the required education and qualifications in both the short term (2013) and long term (2020).

Study of fish stocks in Lake Võrtsjärv, 2011

Tartu 2012
Commissioned by: Ministry of the Environment
Carried out by: Limnology Centre of EULS IAE
Funded by: EIC

This project ascertained the stock status of essential commercial fish – eel, pikeperch, pike, bream and perch – in Lake Võrtsjärv in 2011. On this basis, suggestions for the management of the stocks in 2012 and 2013 were made and a forecast of catches for up to five years was issued. The abundance of major non-commercial fish was also assessed.

References

Armulik, T., Sirp, S. (compilers) 2012. Estonian Fishery 2011. Fisheries Information Centre.

Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises, OJ L 124, 20.5.2003, p. 36-41 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:EN:PDF).

Eesti Uuringukeskus OÜ 2012. Eesti harrastuskalapüügi kvantitatiivuuring. Commissioned by: Ministry of the Environment. 21.08.2013 (http://www.envir.ee/orb.aw/class=file/action=preview/ id=1201779/Harrastuskalapyyk_2012.pdf).

Casey, J., Abella, J. A., Andersen, J., Bailey, N., Bertignac, M., Cardinale, M., Curtis, H., Daskalov, G., Delaney, A., Döring, R., Garcia Rodriguez, M., Gascuel, D., Graham, N., Gustavsson, T., Jennings, S., Kenny, A., Kirkegaard, E., Kraak, S., Kuikka, S., Malvarosa, L., Martin, P., Motova, A., Murua, H., Nord, J., Nowakowski, P., Prellezo, R., Sala, A., Scarcella, G., Somarakis, S., Stransky, C., Theret, F., Ulrich, C., Vanhee, W. & Van Oostenbrugge, H. 2013. STECF. Review of scientific advice for 2014 – Advice on stocks in the Baltic Sea. JRC Scientific and Policy Reports. Luxembourg.

Eesti vesiviljeluse sektori arengustrateegia 2014–2020.

ICES 2012. Report of the Baltic Fisheries Assessment Working Group (WGBFAS). ICES CM 2012/ ACOM : 10.

ICES 2012a. Report of the ICES Advisory Committee, 2012. ICES Advice, 2011, Book 3.

ICES 2012b. Report of the ICES Advisory Committee, 2012. ICES Advice, 2011, Book 9.

ICES 2012c. Report of the Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP), 28 March–5 April, Copenhagen, Denmark. ICES CM 2012/ACOM: 17.

ICES 2013. Report of the Baltic Fisheries Assessment Working Group. ICES CM 2013/ACOM: 10.

Järvalt, A., Bernotas, P., Kask, M., Silm, M. (compilers) 2013. Võrtsjärve kalavarude seisund ja Eesti angerjamajandamiskava täitmise analüüs. Institute of Agricultural and Environmental Sciences at the Estonian University of Life Sciences (http://www.envir.ee/orb.aw/class=file/action=preview/id=1195369/ V6rtsj2rv+aruanne+2012.pdf).

Commission Regulation (EC) No 949/2008 of 25 September 2008 fixing the maximum export refund for white sugar in the framework of the standing invitation to tender provided for in Regulation (EC) No 900/2007, OJ L 258, 26.9.2008, p. 62 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:258:0062:0062:EN:PDF).

Männaste, K. 2011. Eesti harrastuskalapüügi kvantitatiivuuring. CATI consumer survey, May-June 2011. Report by TNS Emor AS.

NAFO 2011. 2011 Annual Meeting Press Release. NAFO Performing Well. Northwest Atlantic Fisheries Organization (http://nafo.int/about/media/press/press-2011.pdf).

NAFO 2011a. Scientific Council Reports 2010. Northwest Atlantic Fisheries Organization.

NAFO 2012. Conservation and enforcement measures. NAFO/FC Doc. 12/1. Serial No. N6001.

NAFO 2012a. 2012 Annual Meeting Press Release. NAFO Continues To Move Forward. (http://nafo.int/about/media/press/press-2012.pdf).

NAFO 2012b. Scientific Council Reports 2011. Northwest Atlantic Fisheries Organization.

NIPAG 2012. NAFO/ICES Pandalus Assessment Group Meeting, 17–24 October 2012. NAFO SCS Doc. 12/23 Serial No. N6132.

Council Regulation (EU) No 44/2012 of 17 January 2012 fixing for 2012 the fishing opportunities available in EU waters and, to EU vessels, in certain non-EU waters for certain fish stocks and groups of fish stocks which are subject to international negotiations or agreements, OJ L 25, 27.1.2012, p. 55–147 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:025:0055:0147:EN:PDF).

Council Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy, OJ L 60, 5.3.2008, p. 1-12 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:060:0001:0012:EN:PDF).

Council Regulation (EC) No 1098/2007 of 18 September 2007 establishing a multiannual plan for the cod stocks in the Baltic Sea and the fisheries exploiting those stocks, amending Regulation (EEC) No 2847/93 and repealing Regulation (EC) No 779/97, OJ L 248, 22.9.2007, p. 1-10 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:248:0001:0010:EN:PDF).

MoA 2013. Eesti kalanduse strateegia 2014–2020 (http://www.agri.ee/public/juurkataloog/KALAMAJANDUS/EKS/2014-2020/strateegia-eks-2014.pdf).

Website of Statistics Estonia, http://www.stat.ee.

Vetemaa, M. 2008. Eesti kalalaevastiku tasuvuse analüüs. Final report under Contract for Services No 116 (entered into in Tallinn on 3 April 2008 between the Ministry of Agriculture and the Estonian Marine Institute at the University of Tartu).

2008/949/EC: Commission Decision of 6 November 2008 adopting a multiannual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy, OJ L 346, 23.12.2008, p. 37–88 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:346:0037:0088:EN:PDF).

Measures and types of action supported in 2012 under the Operational Programme of the European Fisheries Fund 2007–2013, RT I, 26.01.2012, 1 (https://www.riigiteataja.ee/akt/102102012003).

Estonian Fishery 2012

ISSN 2228–1495

Kalanduse teabekeskus
www.kalateave.ee

EUROOPA
KALANDUSFOND
JÄTKUSUUTLIKU KALANDUSE HEAKS

Toetab Euroopa Liit