ESTONIAN FISHERY 2013

FISHERIES INFORMATION CENTRE

Compiled by:
Toomas Armulik & Silver Sirp

Authors:
Redik Eschbaum, Heiki Jaanuska,
Ain Järvalt, Janek Lees, Tiit Paaver, Katrin Pärn,
Tiit Raid, Aimar Rakko, Toomas Saat, Silver Sirp
& Väino Vaino

Edited by:
Toomas Armulik & Silver Sirp

Translated by: Päevakera OÜ
Layout: Eesti Loodusfoto OÜ
Cover photo by: Markus Vetemaa

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Estonian Fishery 2013

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Contents

Foreword

Dear reader,

The Fisheries Information Centre has prepared yet another survey – the fourth already – of Estonian fishery. Previously, the Information Centre has published fishery surveys for 2010, 2011 and 2012. This yearbook, whose structure follows that of its predecessors, gives an overview of the state of Estonian fishery in 2013 and compares it to previous years. By contrast to the preceding yearbooks, this one lacks the chapter on "Ichthyologic and fishery-related research projects" at the end of the book, because the Information Centre has published "Aastatel 2008–2013 valminud kalandus-uuringud" (Fishery Research 2008–2013) as a separate book, which is available to all interested parties, both in hard copy and on our website at www.kalateave.ee.

Fishery is a sector where, in addition to the general economic climate, the environment plays a major role, and hence the success of the sector largely depends on natural conditions. Shrimp has been the most profitable species for Estonian distant-water fishing companies over the years. However, natural stocks and catches of shrimp in the North West Atlantic are declining. The recession of stocks has led to the reduction of fishing quotas for many ocean fish species. All the more reason, then, to rejoice that Estonia has a distant-water fishing company to which a MSC certificate has been issued for shrimp fishing!

The number of coastal fishermen was roughly the same in 2013 as in earlier periods – 1860. As this figure has remained stable over the past couple of years, there is reason to argue that the proportions of those quitting due to old age and young fishermen just starting out are balanced. However, the trend of only a few people being able to earn a year-round living from fishing persists. Time and again coastal fishermen have to show ingenuity and think of ways to add value to their catches and to find alternative earning opportunities from coastal tourism or other sea-related activities. Support from the European Fisheries Fund has played an invaluable role in the implementation of such projects, e.g. in the renovation and modernisation of a number of small ports, the construction of seaside accommodation and the development of small enterprises to add value to catches.

Perch and herring continued to be the main sources of income for coastal fishermen in 2013. There was significant growth in perch catches, but the decline in the first-sale prices of perch compared to 2012 was a fly in the ointment.

The largest catches are still being landed by the trawling segment, which accounts for nearly 80% of the Estonian commercial fishing sector. 2013 saw a slight increase in our sprat quota, which was used up almost completely thanks to favourable weather conditions. Since Estonian fishermen have three producer organisations equipped with state-of-the-art cold stores, they can store their catches and sell the fish when the price is acceptable.

Some new fish farms started activities in the aquaculture sector in 2013. This, however, did not lead to a significant increase in production. Production volumes reached the levels of 2009 again, but many modern recirculation systems are still not operational, and the fish farms established with the support of the EFF have been unable to meet the prescribed levels of production. We hope that the implementation of the Estonian Aquaculture Development Strategy drawn up in 2013 will lead to the domestic production of farmed fish reaching consumers in growing volumes and that companies farming new fish species in addition to the traditional rainbow trout and carp will also prove viable.

Although recent assessments indicate that the realistic number of recreational fishermen is lower than that mentioned in the previous yearbooks, nearly one hundred thousand "anglers" is still an impressive result for a small nation – almost every tenth person is involved in fishing as an active recreational sport in Estonia.

The number of companies whose core business is the processing of fish and other seafood has declined somewhat, but the aggregate sales revenue of the sector has increased. The strength and viability of the fish processing industry of Estonia is evidenced by the fact that the majority of fish processing companies closed the financial year at a profit, and new jobs were also created.

When browsing through the 'Estonian Fishery 2013' yearbook, dear reader, you might get the impression that this sector is all dry numbers and dull tables and figures. Nothing could be further from the truth – each and every number refers to the hard day-to-day work of thousands of lively and active people. For many of them, fishing has been a source of livelihood for generations. Estonia was, is and always will be a maritime country where fishery has a specific economic and social role. We all can contribute to the fulfilment of this role by consuming Estonian fishery products.

Toomas Armulik
Head of Fisheries Information Centre

Abbreviations

ARIB	Agricultural Registers and Information Board
B_{lim}	The biomass limit, reaching which should be prevented by fisheries management, as below this level the risk of stock collapse increases significantly
CPUE	Catch per unit effort i.e. yield; for example kg/h or kg/net
EFF	European Fisheries Fund
EIC	Environmental Investment Centre
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
M	Natural mortality
MoA	Ministry of Agriculture
MoE	Ministry of the Environment
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission
NIPAG	Joint NAFO/ICES Pandalus Assessment Working Group
NPUE	Number per unit effort
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 the University of Tartu
WPUE	Weight per unit effort
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 2013), there were five vessels in the distant-water fishing segment. Three vessels catch shrimp (Northern prawn) as the main target species and less frequently also fish, and two vessels only catch fish as the main target species. One fishing vessel (Eldborg) was deleted from the register. The average length of the vessels is 60 metres; the average age is 27 years; the combined power of the vessels' main engines is 13,174 kW; and the combined gross tonnage (GT) is 7697 tonnes (Table 1). The average age of the vessels decreased compared to that recorded on 31 December 2012 because the deregistered vessel had been built in 1974. All the registered vessels were actually engaged in fishing, i.e. the register contained only active fishing vessels. In previous years it was sometimes the case that a vessel was in the register but in reality was not used for fishing. The vessels are owned by three companies.

Table 1. Main characteristics of Estonian distant-water fishing fleet, 2005–2013

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
2013	5	13 174	7 697

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 with demersal trawlers 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). In 2013 a decision was taken to expand the closed areas (NAFO 2013). Due to precautions, these fishing grounds are expected to remain closed until 2014. Protected areas will be officially announced following the analysis of the data collected.

Fishing quotas are agreed between member states at the annual meetings of NAFO and NEAFC. The current moratoria on the fishing of certain stocks (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) were continued in the NAFO area in 2013 (NAFO 2013).

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 both 2012 and 2013 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 increased in 2013 by 8% and the quota for 3M cod was increased by 52%, which implies belief in the improvement of the state of the cod stock (Table 2).

Species are interrelated through dietary relationships. As the biomass of shrimp-eating fish has increased and environmental conditions have probably

Table 2. Estonia's distant-water fishing quotas for 2005–2013, before charter arrangements and quota transfers, in tonnes and fishing days, by fishing ground, and change (%) compared to 2012

Species	Unit	Fishing ground	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change (%) in fishing quota from 2012 to 2013
Shrimp or northern prawn,*Pandalus borealis*, PRA	fishing day	NAFO 3M	1667	1667	1667	1667	1667	834	0	0	0	0
Pandalus borealis, PRA	tonne	NAFO 3L	144	245	245	278	334	334	214	134	96	–28
Atlantic redfishes nei,	tonne	NAFO 3M	1571	1571	1571	1571	1571	1571[1]	1571	1571	1571	0
Sebastes spp, RED	tonne	NAFO 3LN	0	0	0	0	0	173	297	297	322	8
Northern shortfin squid, *Illex illecebrosus*, SQI	tonne	NAFO 3 ja 4	128	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	312	–5
Raja rays nei, *Raja* spp, SKA	tonne	NAFO 3LNO	546	546	546	546	546	485	485	343	283	–17
Atlantic cod, *Gadus morhua*, COD	tonne	NAFO 3M	0	0	0	0	0	61	111	103	157	52
Mackerel, *Scomber scombrus*, MAC	tonne	NEAFC	115	119	135	124	165	107	172	170	144	–15
Roundnose grenadier, *Coryphaenoides rupestris*, RNG	tonne	NEAFC	77	77	67	67	57	49	43	38	63	66
Black scabbardfish, *Aphanopus carbo, BSF*	tonne	NEAFC	17	17	17	17	15	14	13	12	17	42
Dogfish sharks nei, *Squalidae*, DGX	tonne	NEAFC	10	10	4	2	1[2]	0[3]	0[4]	0	0	0
Blue ling, *Molva dypterygia*, BLI	tonne	NEAFC	5	5	4	3	3	3	5	3	4	33
Atlantic redfishes nei, *Sebastes* spp, RED	tonne	NEAFC	344	284	210	210	210	210	177	149[6]	121[6]	–19
Greenland halibut, *Reinhardtius hippoglossoides*, GHL	tonne	NEAFC	10	8	6	6	4	3	2	2	13	550
Raja rays nei, *Raja* spp, SKA[5]	tonne	NEAFC					8	7	6	5	0	0
Shrimp or northern prawn, *Pandalus borealis*, PRA	fishing day	Svalbard	377	377	377	377	377	377	377	377	377	0
Total	tonne		3347	3381	3254	3273	3740	3843	3946	3660	3608	–1
	fishing day		2044	2044	2044	2044	2044	1211	377	377	377	0
Change in tonne quotas since 2012	%		–15	–14	–18	–17	–5	–3	0	–7	–1	

[1] Estonia's revised quota was 841 tonnes, as the catches in 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 to up to 10% of the quotas for 2009. [4] By-catches are permitted to 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, EU Council Regulations (EC) No 1359/2008, 43/2009 and (EU) No 53/2010, 1225/2010, 57/2011, 44/2012, 297/2013, 1262/2011.

become less favourable for shrimp, the stock of shrimp in NAFO division 3M is in a poor state. There are no signs of the stock recovering, and therefore the moratorium on commercial fishing for 3M shrimp established in 2011 was continued and also applied in 2013. The state of shrimp stocks has also deteriorated in divisions 0 and 1 since 2004.

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 2008–2013. From 2010–2012 it was recommended to gradually limit catches, and in 2013 quotas were once again reduced by 28%, which resulted in a quota that is the lowest of the time series (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. Fishing opportunities in the North East Atlantic are usually exchanged for fishing opportunities in the North West Atlantic, while the shrimp quota is retained. The shrimp stock continues to be in good condition in the North East Atlantic fishing grounds and is not threatened by current catches. However, some vessels find fishing for this stock unattractive due to area closures intended to protect young fish and due the movement of shrimp away from the traditional fishing grounds, forcing the vessels to sail long distances without fishing. Stock indicators have not changed a great deal – 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 has varied from 2004–2013 with no specific trend (NIPAG 2014).

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 it is possible to fish in e.g. the South West Atlantic, where Estonian vessels used this opportunity in 2005, 2006, 2010, 2011 and 2012, but not in 2013. There is no regional fisheries management organisation (RFMO) in the area, and no quotas have been allocated to Estonia there.

Catches

From 2005–2013, distant-water fishing vessels flying the flag of Estonia only fished in the Atlantic Ocean, with shrimp and various fish being the target species. In 2013, shrimp produced the biggest catches, followed by redfish and mackerel (Figure 1, Table 3). Catches of cod in the North West Atlantic grew from 60 tonnes in 2012 to approximately 500 tonnes in 2013, which also shows an improvement in the cod stock in the area. In the North East Atlantic the catches of cod remained unchanged. In this area Estonia generally only uses shrimp, cod and American plaice quotas, the latter two species being caught as by-catches in shrimp fishing (Table 4).

For the first time in several years, our vessels again fished for mackerel in 2013. The quota for experimental fishing in Eastern Greenland was obtained from Denmark and Greenland. Some lumpfish was caught as by-catch in mackerel fishing. The large total catch ranked mackerel third in terms of catch volume in 2013 (Figure 1).

Catches from the North West Atlantic area have changed the most: around 15,000 tonnes in 2005 and approximately 4500 tonnes in 2013, but relatively persistently around 5100 tonnes in the period 2009–2013. The quantities caught in

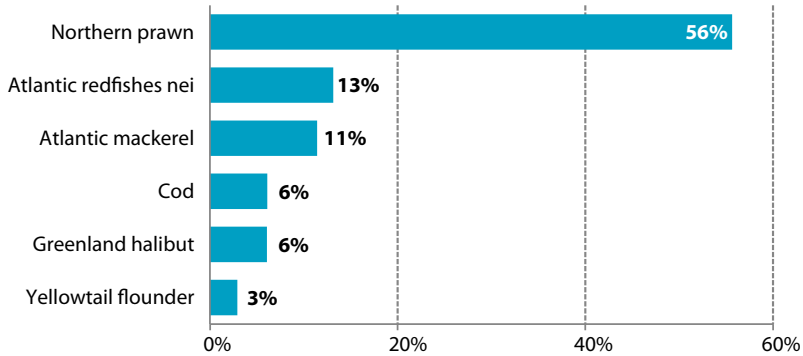
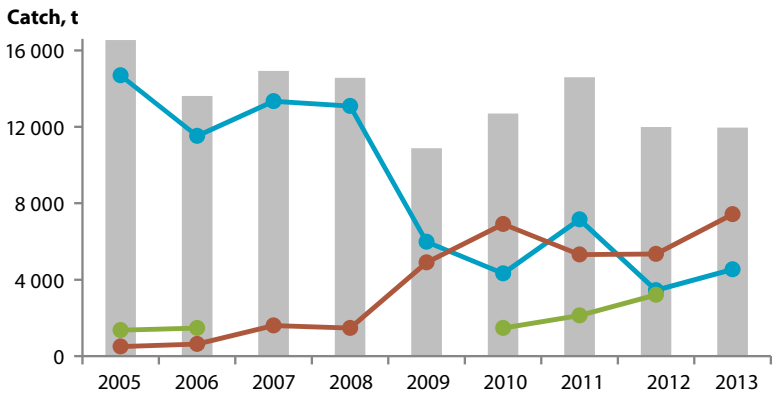


Figure 1. **Proportion (%) of catch by main species in distant-water fishery sector in 2013** Source: MoA



	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	16 539	13 617	14 930	14 559	10 881	12 699	14 590	11 990	11 956
North West Atlantic	14 690	11 515	13 332	13 086	5 979	4 329	7 146	3 444	4 533
North East Atlantic	494	633	1 598	1 473	4 903	6 906	5 318	5 340	7 422
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, 2005–2013.** Source: MoA

Table 3. Estonia's distant-water fishery catches (t) by species, 2005–2013

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013
Aesop shrimp, *Pandalus montagui*							858		
American anglerfish, *Lophius americanus*									<1
Blue antimora, *Antimora rostrata*			3						
Argentine shortfin squid, *Illex argentinus*	581	499				42	329	1 248	
Argentine hake, *Merluccius hubbsi*		700				1 125	1 395	1 571	
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	11
American plaice, *Hippoglossoides platessoides*	47	34	33	77	29	9	36	37	226
Splendid alfonsino, *Beryx splendens*		4							
Atlantic mackerel, *Scomber scombrus*									1 367
Atlantic wolffish, *Anarhichas lupus*				12	5				
Northern prawn, *Pandalus borealis*	12 381	9242	12 076	12 742	8 587	9 037	9 919	7 576	6 653
Silver hake, *Merluccius bilinearis*								< 1	
Roundnose grenadier, *Coryphaenoides rupestris*	154	104	140						
Mediterranean slimehead, *Hoplostethus mediterraneus*		1							
Haddock, *Melanogrammus aeglefinus*	< 1							8	19
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	1 111	1 156	1 040	1 003	1 748	1 340	1 075	368	1 573
Wolffishes nei, *Anarhichas* spp	74	63	10	2					1
Lumpfish, *Cyclopterus lumpus*									<1
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	16
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	110
Raja rays nei, *Raja* spp	62	258	366	123	29	228	82	161	155
Rays, stingrays, mantas nei, *Rajiformes*	479								
Yellowtail flounder, *Limanda ferruginea*	20	6	25	33		4	13	31	350
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	727
Threebearded rockling, *Gaidropsarus ensis*					1	3			
Cod, *Gadus morhua*	33	52	25	73	128	93	105	285	730
Spotted wolffish, *Anarhichas minor*						12			16
White hake, *Urophycis tenuis*	1		32	19				< 1	<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**	**11 956**

Sources: MoA and MoE

Table 4. Estonia's distant-water fishery catches (t) by area and species, 2013

Species	Scientific name	Code	North West Atlantic	North East Atlantic	Total
American anglerfish	*Lophius americanus*	ANG	0.184		0.184
Atlantic halibut	*Hippoglossus hippoglossus*	HAL	11.385		11.385
American plaice	*Hippoglossoides platessoides*	PLA	123.230	102.568	225.798
Atlantic mackerel	*Scomber scombrus*	MAC		1 366.746	1 366.746
Northern prawn	*Pandalus borealis*	PRA	926.180	5 727.206	6 653.386
Haddock	*Melanogrammus aeglefinus*	HAD	19.451		19.451
Atlantic redfishes nei	*Sebastes* spp	RED	1 572.610		1 572.610
Wolffishes nei	*Anarhichas* spp	CAT	1.110		1.110
Lumpfish	*Cyclopterus lumpus*	LUM		0.295	0.295
Witch flounder	*Glyptocephalus cynoglossus*	WIT	15.604		15.604
Roughhead grenadier	*Macrourus berglax*	RHG	109.610		109.610
Raja rays nei	*Raja* spp	SKA	155.448		155.448
Yellowtail flounder	*Limanda ferruginea*	YEL	350.197		350.197
Greenland halibut	*Reinhardtius hippoglossoides*	GHL	727.112		727.112
Cod	*Gadus morhua*	COD	504.909	225.511	730.420
Spotted wolffish	*Anarhichas minor*	CAS	15.695		15.695
White hake	*Urophycis tenuis*	HKW	0.531		0.531
Total			**4 533.257**	**7 422.326**	**11 955.583**

Source: MoA

the North East Atlantic increased from 2005–2013 and reached more or less the same levels as in the North West Atlantic in the period 2009–2012. The North East Atlantic fishing grounds are thus currently important to Estonian distant-water fishers. Catches taken in the South West Atlantic grew in previous years, but our vessels did not fish there in 2013. The total catch for 2013 was at the average level of the period 2009–2012 (Figure 2, Table 4). Catches are usually landed in ports of Canada, Iceland, Spain and Norway.

Outlook

In 2013 the shrimp stock of the third division of the North West Atlantic was clearly moving towards a moratorium, which is also indicated by the reduction of our quota by 28%. Estonian shrimp-fishers are increasingly shifting their fishing efforts to the Barents Sea. This is also demonstrated by the fact that Estonian distant-water fishers obtained an MSC certificate for shrimp fishing in the Barents Sea, having successfully completed a full assessment that began in 2012 and lasted around ten months. This certificate will probably be needed for other species as well, and it enhances the competitiveness of the sector on the global market. In the North West Atlantic fishing grounds some of the fish stocks are fortunately showing signs of recovery, which will allow the relevant quotas to be increased.

The South West Atlantic fishing grounds 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

1865 coastal fishermen fished in the Baltic Sea in 2013. This figure has generally remained at the same level for the last three years. While the number of coastal fishermen declined during the period of booming economic growth as they found better-paid jobs, their numbers started to increase again when the recession hit (Figure 3). Hopefully, the stabilised number of fishermen is an indication that the economy has started to grow again and that fishing pressure on stocks is decreasing. It is estimated that fishing is the main source of income for no more than 10% of coastal fishermen. By county, the numbers of coastal fishermen entered on fishing permits were as follows in 2013:

Ida-Viru County (excl. Lake Peipsi): 125
Lääne-Viru County: 135
Harju County: 306
Hiiu County: 291
Lääne County (incl. Vormsi): 261
Saare County (incl. Ruhnu): 409
Pärnu County (incl. Kihnu and Manija): 380

Source: Fisheries Information System of the MoA

Fishing efforts decline in years when the abundance of fish is low, as well as when fishermen find better-paid jobs. However, an increase in the cost-effectiveness or relative cost-effectiveness of fishing is immediately followed by an increase in fishing efforts because the maximum amount of permitted fishing gear is high. This contributes to possible over-fishing of improved stocks. The maximum amount of permitted fishing gear should be reduced, if possible, but opposition from fishermen makes it difficult to achieve this. As a way of addressing this situation, the state could buy from fishermen their historic fishing rights, which constitute the primary basis for determining the maximum amount of permitted fishing gear, i.e. act by analogy to the removal ('scrapping') of trawlers. According to the Fisheries Information System of the MoA, coastal fishermen used 1464 vessels with a length of less than 12 metres in the Baltic Sea in 2013.

As in 2012, the biggest catches taken in 2013 were those of herring, followed by perch, smelt, flounder, pikeperch, roach and pike (Figure 4). Coastal fishermen caught a total of 9614 tonnes of fish in 2013, which is significantly more than in 2012. The quantity of perch caught grew the most – by approximately 667 tonnes. The increase in the quantity of smelt caught – by around 208 tonnes – is also noteworthy (Table 5).

While in 2012 coastal fishermen earned the most from herring fishing (based on average first-sale prices), in 2013 (as in 2010 and 2011) perch was the most

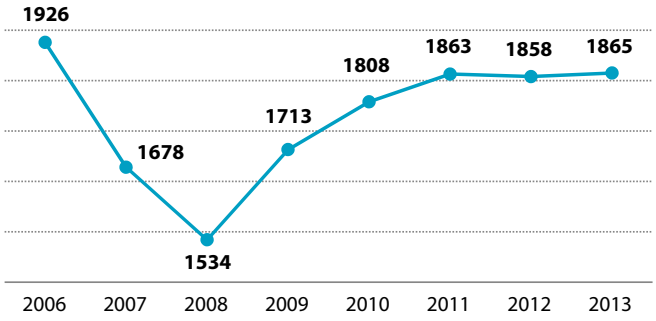


Figure 3.
Number of coastal fishermen fishing in Baltic Sea, 2006–2013
Sources: MoE, MoA

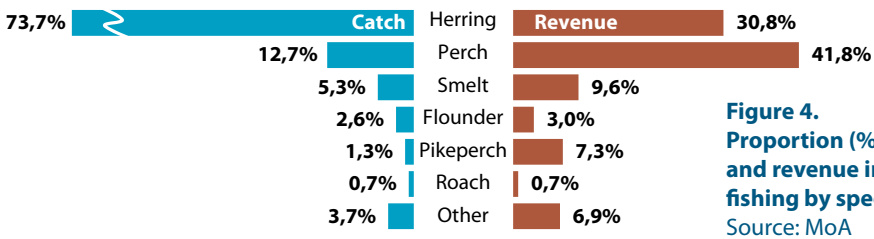


Figure 4.
Proportion (%) of catch and revenue in coastal fishing by species in 2013
Source: MoA

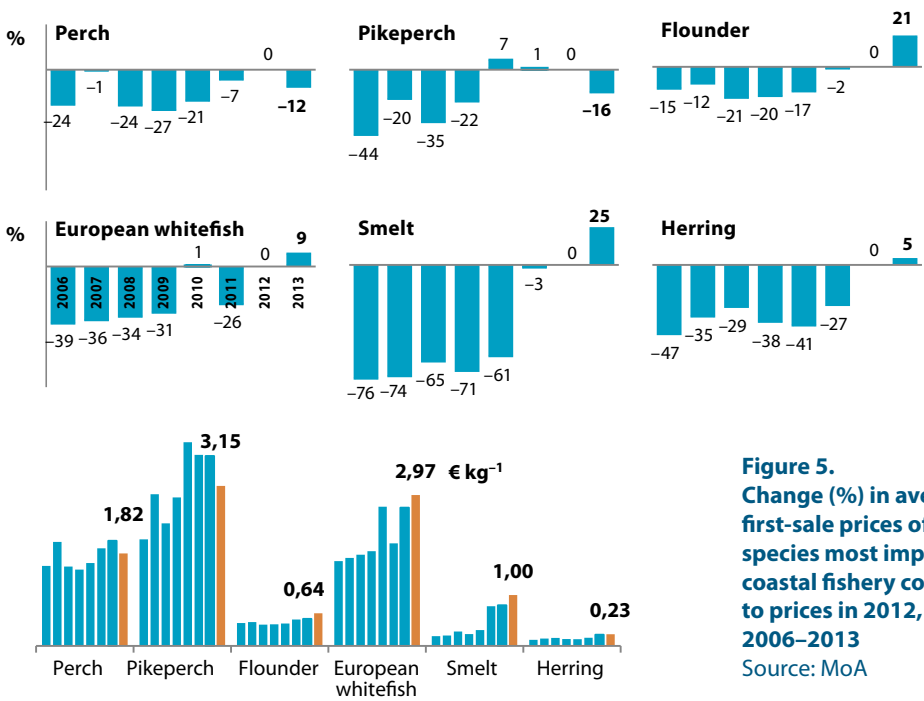


Figure 5.
Change (%) in average first-sale prices of fish species most important to coastal fishery compared to prices in 2012, 2006–2013
Source: MoA

lucrative species (2.22 million euros). In terms of profitability, perch was followed by herring (1.63 million euros), smelt (0.51 million euros), pikeperch (0.38 million euros) and flounder (0.16 million euros) in 2013. The share of garfish, which

held fifth place in 2011, has steadily declined in subsequent years. This is due to the fact that garfish is caught with the same pound nets as herring, and once the herring quota is exhausted, fishing for garfish must also be discontinued.

Table 5. Coastal fishing catches (t) and proportion (%) of total catch from Baltic Sea from 2010–2013 by species

Species	2010		2011		2012		2013	
	Catch	%	Catch	%	Catch	%	Catch	%
Perch	878.76	7.8	795.84	7.7	549.85	6.3	1216.99	12.6
Eel	3.45	<0.1	2.21	<0.1	1.91	0.0	1.65	<0.1
Eelpout	0.81	<0.1	0.09	<0.1	0.39	0.0	1.15	<0.1
Turbot	0.18	<0.1	0.10	<0.1	0.08	0.00	0.04	<0.1
Atlantic mackerel	<0.01	<0.1	0.00	<0.1	0.00	0.0	<0.01	<0.1
Pike	22.77	0.2	32.07	0.3	35.38	0.4	65.90	0.7
Gibel carp	51.32	0.5	47.64	0.5	59.66	0.7	56.54	0.6
Lamprey	0.57	<0.1	0.89	<0.1	0.36	0.0	1.00	<0.1
Carp	0.14	<0.1	0.08	<0.1	0.12	0.0	0.30	<0.1
Ruff	32.36	0.3	60.80	0.6	51.18	0.6	38.76	0.4
Sprat	0.15	<0.1	0.64	<0.1	0.14	0.0	1.18	<0.1
Pikeperch	73.36	0.7	110.52	1.1	146.83	1.7	122.16	1.3
Bream	3.58	<0.1	7.55	0.1	11.10	0.1	8.77	0.1
Flounder	269.77	2.4	244.99	2.4	212.93	2.4	250.03	2.6
Tench	2.26	<0.1	2.96	<0.1	3.32	0.0	4.00	<0.1
Burbot	1.30	<0.1	1.62	<0.1	1.66	0.0	2.80	<0.1
Salmon	3.80	<0.1	4.42	<0.1	5.31	0.1	6.82	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	14.67	0.2
Four-horned sculpin	0.03	<0.1	0.02	<0.1	0.07	0.0	0.03	<0.1
European whitefish	15.54	0.1	14.62	0.1	20.60	0.2	25.76	0.3
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	506.41	5.2
Lumpfish	<0.01	<0.1	0.00	<0.1	0.00	0.0	<0.01	<0.1
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	30.91	0.4
Thicklip grey mullet							<0.01	<0.1
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	1.76	<0.1
Herring	9236.65	82.2	8597.27	83.1	7088.92	81.2	7087.77	73.7
Ide	6.30	0.1	6.13	0.1	4.47	0.1	7.05	0.1
Roach	66.48	0.6	83.24	0.8	77.80	0.9	71.08	0.7
Dace	<0.01	<0.1	0.02	<0.1	0.00	0.0	<0.01	<0.1
Cod (Atlantic cod)	3.69	<0.1	3.50	<0.1	3.41	0.0	5.26	0.1
Garfish	86.05	0.8	117.74	1.1	25.04	0.3	19.14	0.2
Bleak	0.11	<0.1	0.06	<0.1	0.34	0.0	0.10	<0.1
Rainbow trout	0.09	<0.1	0.14	<0.1	0.07	0.0	0.19	<0.1
Vimba bream	29.82	0.3	50.08	0.5	53.26	0.6	56.41	0.6
Twaite shad	0.03	<0.1	0.00	<0.1	0.01	0.0		
Lesser sand eel							0.74	<0.1
Round goby	1.12	<0.1	4.05	<0.1	16.91	0.2	9.08	0.1
Total	**11 242.89**	**100.0**	**10 350.50**	**100.0**	**8721.48**	**100.0**	**9614.47**	**100.0**

Source: MoA

Based on first-sale prices, the sales revenues of coastal fisherman are estimated to have amounted to 5.30 million euros in 2013.

Thus, fishermen's sales revenue has grown steadily over the last three years (Table 7). The first-sale price of perch fell by 12%, but the quantity of perch landed almost doubled, which offset the decline and made perch the most important species to coastal fishermen in terms of profitability (Figure 4).

The average first-sale prices of the key species, as published in the official publication *Ametlikud Teadaanded*, changed from 2012 as follows: perch –12%; pikeperch –16%; smelt +25%; and flounder +21%. The first-sale price of herring changed by just +5% (Table 6, Figure 5).

Table 6. Average first-sale prices of fish (€ kg^{-1}), 2006–2013

Species	2006	2007	2008	2009	2010	2011	2012	2013
Perch	1.58	2.05	1.56	1.50	1.63	1.92	2.07	1.82
Eel	5.92	5.68	5.58	5.14	5.72	6.56	7.35	8.36
Eelpout	0.06		0.13		0.36	0.14	0.21	0.46
Pike	0.84	0.92	0.98	1.05	1.05	1.33	1.43	1.23
Gibel carp	0.14	0.12	0.14	0.12	0.11	0.11	0.12	0.13
Lamprey	1.95	1.96	1.88	1.76	1.68	2.96	3.64	4.86
Carp	0.40	0.31	0.27	0.74	0.94	1.11	0.78	0.84
Ruff	0.06	0.10	0.08	0.09	0.13	0.16	0.20	0.19
Sprat	0.12	0.15	0.17	0.15	0.13	0.17	0.20	0.22
Crucian carp	0.11	0.04		0.32	0.30	0.25	0.21	0.24
Pikeperch	2.10	2.99	2.41	2.92	4.01	3.76	3.74	3.15
Bream	0.35	0.38	0.40	0.49	0.45	0.56	0.58	0.55
Flounder	0.45	0.47	0.42	0.42	0.44	0.52	0.53	0.64
Tench	0.73	0.76	0.95	0.80	0.86	1.09	1.01	1.38
Burbot	0.55	0.52	0.56	0.61	0.63	0.76	0.77	0.91
Salmon	2.79	1.35	3.29	1.64	2.63	3.95	4.09	4.40
Baltic prawn				2.36				
Sea trout	1.87	2.55	2.05	1.47	1.68	3.00	3.54	3.99
Four-horned sculpin								0.25
European whitefish	1.67	1.73	1.79	1.87	2.74	2.02	2.72	2.97
Smelt	0.19	0.20	0.28	0.23	0.31	0.78	0.80	1.00
Silver bream	0.07	0.07	0.07	0.07	0.09	0.12	0.11	0.10
Lake Peipsi whitefish	1.31	0.81	0.99	1.04	0.94	1.00	1.92	2.12
Lake Peipsi (dwarf) smelt	0.41							
Rudd	0.11	0.03	0.13	0.07	0.04	0.06	0.06	0.11
Herring	0.12	0.14	0.16	0.14	0.13	0.16	0.22	0.23
Vendace		1.04	1.01	1.43	2.88		3.44	3.32
Ide	0.28	0.40	0.39	0.42	0.46	0.64	0.48	0.62
Roach	0.16	0.28	0.39	0.39	0.44	0.48	0.50	0.55
European chub				0.19				0.30
Cod	1.43	0.80	0.55	1.10	0.92	1.03	0.95	1.03
Garfish	0.28	0.37	0.38	0.43	0.47	0.71	0.89	1.43
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	0.50
Round goby		0.20	0.25	0.34	0.32	0.39	0.20	0.14

Source: official publication *Ametlikud Teadaanded*

Table 7. **Value (10^3 euros) of coastal fishing catches from Baltic Sea and proportion (%) of total value from 2011–2013 by species**

Species	2011		2012		2013	
	Value	Proportion	Value	Proportion	Value	Proportion
Perch	1528.02	39.5	1138.04	29.0	2214.93	41.8
Eel	14.48	0.4	14.02	0.4	0.19	<0.1
Eelpout	0.01	<0.1	0.08	<0.1	4.84	0.1
Turbot			0.04	<0.1		
Pike	42.65	1.1	50.63	1.3	7.35	0.1
Gibel carp	5.24	0.1	8.03	0.2	28.21	0.5
Lamprey	2.62	0.1	1.32	<0.1		
Carp	0.09	<0.1	0.10	<0.1	0.26	<0.1
Ruff	9.73	0.3	10.24	0.3	81.06	1.5
Sprat	0.11	<0.1	0.03	<0.1	0.53	<0.1
Pikeperch	415.54	10.7	549.10	14.0	384.79	7.3
Bream	4.23	0.1	6.44	0.2	4.82	0.1
Flounder	127.39	3.3	112.83	2.9	160.02	3.0
Tench	3.23	0.1	3.35	0.1	5.53	0.1
Burbot	1.23	<0.1	1.28	<0.1	13.83	0.3
Salmon	17.47	0.5	21.82	0.6	4.37	0.1
Sea trout	40.20	1.0	61.18	1.6	58.52	1.1
Four-horned sculpin					<0.01	<0.1
European whitefish	29.54	0.8	55.56	1.4	27.36	0.5
Smelt	93.88	2.4	238.63	6.1	506.41	9.6
Silver bream	2.70	0.1	3.66	0.1	3.09	0.1
Stickleback					<0.01	<0.1
Rudd	0.29	<0.1	0.10	<0.1	2.55	<0.1
Herring	1375.56	35.6	1559.56	39.7	1630.19	30.8
Ide	3.92	0.1	2.14	0.1	30.03	0.6
Roach	39.96	1.0	38.90	1.0	39.09	0.7
Cod	3.60	0.1	3.24	0.1	5.41	0.1
Garfish	83.60	2.2	22.28	0.6	76.50	1.4
Bleak			0.03	<0.1		
Vimba bream	21.54	0.6	22.90	0.6	7.36	0.1
Round goby	1.58	<0.1	3.38	0.1	1.27	<0.1
Total	**3868.42**	**100.0**	**3928.91**	**100.0**	**5298.78**	**100.0**

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, European whitefish, smelt and sea trout. Among key species, the catch of perch grew the most compared to the previous year, while increases in the catches of herring, flounder, European whitefish, smelt and pikeperch were less pronounced in 2013. Catches of garfish and sea trout declined (Table 8). In 2013 the catch of round goby decreased – and significantly so – for the first time since this species was first recorded in catch statistics. Herring pro-

duced the biggest sales revenue (around 226,000 euros) in the Gulf of Finland, followed by perch (around 125,000 euros), flounder (around 48,000 euros), European whitefish (around 42,000 euros) and sea trout (around 36,000 euros).

Herring is caught in the Gulf of Finland mainly using trap nets. Herring catches were bigger from 2009–2013 than in 2007–2008. The herring catch of 2013 exceeded both the average of the period and the catches of the two preceding years. **Flounder** is usually caught using gill nets in the western part of the gulf. After three years of decline the catch of flounder increased slightly in 2013 compared to 2012. However, flounder stocks are not expected to grow in the coming years. **Perch** is mostly caught using gill nets, with the proportion of trap net catches varying from year to year. In 2013 the catch of perch, which had been declining since 2009, exceeded the catch taken in 2012 by more than twice. **European whitefish** is caught in the Gulf of Finland mainly with gill nets. Whitefish catches declined from 2008–2011 and increased in recent years (2012 and 2013), while not exceeding the average of the period 2007–2013. **Smelt** is generally also caught using gill nets. Catches increased in two consecutive years (2012 and 2013) and, following the recession of 2010–2012, the catch taken in 2013 exceeded the average of the period 2007–2013. **Sea trout** and **salmon** are mainly caught with gill nets as well. Compared to 2012, the catch of salmon grew in 2013, while that of sea trout declined. The catch of **round goby**, an invasive alien species, fell in 2013 almost two-fold after a consistent and rapid increase in preceding years. Whereas in 2012 round goby held fourth position in terms of catch volume in the Gulf of Finland, it fell to seventh in the catch statistics of 2013. **Gibel carp**, another alien species, was eighth in terms of catch volume after round goby in 2013.

In summary, the total catch taken in 2013 exceeded the average of the period 2007–2013 even if herring as the mass fish is not taken into account.

High seas

Fishing gear used in coastal regions towards the Central Baltic near Saaremaa and Hiiumaa includes gill nets, trap nets, longlines and seine nets. The species caught in 2013 were dominated by flounder, followed by herring, perch, roach and European whitefish (Table 9). While the catch of flounder was the highest in each year during the period 2007–2013, the ranking of other species has varied. Flounder also produced the biggest sales revenue in 2013 (around 93,000 euros). Flounder was followed by perch (around 41,000 euros), which in 2012 had only produced revenue of around 12,000 euros and placed it third after sea trout. Sales revenue generated by other species was very low in 2013.

In **flounder** fishing the main fishing gear included gill nets (61% of the catch), seine nets (32%) and trap nets (7%) over the last seven years. Flounder catches taken in this area declined from 2010–2012; in 2013, however, the flounder catch was higher than the average of the period observed (2007–2013). Due to the situation in flounder spawning grounds, the flounder stock is expected to continue to shrink. Until 2010, the second and third positions in terms of catch volume were shared by **garfish** and herring in this area. Both species are mostly caught using trap nets. Garfish catches have decreased in this part of the sea for three years in a row, and the catch taken in 2013 was the lowest of the data series.

The **herring** catch increased slightly in 2013 compared to the previous year and remained above the average of the data series for the second year in a row. Herring continued to be the third species in 2013 in terms of catch volume. 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. Among freshwater fish, **perch** continued to be the most important species in terms of catch volume in 2013, when the quantity landed exceeded the catch taken in 2012 nearly four times. Besides perch, also the catches of pike, European whitefish and ide taken in 2013 were the largest of the last seven years, but the catch of **roach** declined once again.

In summary, the total catch taken in 2013 from coastal regions towards the Central Baltic near Saaremaa and Hiiumaa was higher than the average of the period 2007–2013 thanks to the strong catches of perch and flounder.

Väinameri Sea

Fishing gear used in the Väinameri Sea includes mostly gill nets and trap nets. The relative importance of longlines in fishery is small and continues to decline. In 2013 a seine net was registered for herring fishery for the first time in seven years. Catches taken from the Väinameri Sea are dominated by freshwater fish species. In 2013 the biggest catch was produced by herring, followed by perch, pike, roach and Gibel carp (Table 10). The sequence of these species has continuously varied in recent years. The greatest sales revenues were produced by perch (around 277,000 euros), pike (around 53,000 euros) and herring (around 31,000 euros) in 2013.

Perch is fished mainly using gill nets, but considerable quantities are caught with trap nets as well. Catches fluctuated strongly from 2007–2013, as fishing for perch relied on just a few year classes. The catch taken in 2013 was the highest of the period observed; it was more than four times higher than the catch of 2012 (an increase from 35 tonnes to 152 tonnes) and also the highest since the perch stock crisis in the early 1990s. However, it is worth recalling that the average annual perch catch used to be 500 tonnes in the Väinameri Sea during pre-crisis decades. It would thus be premature to talk about full recovery of the perch stock. **Pike** is caught using both trap nets and gill nets, with the proportion of the latter in the catch accounting for around two-thirds. Pike catches taken in the Väinameri Sea have grown steadily over the past four years. The catch of 2013 was the highest of the entire period observed and exceeded the catch of 2012 by almost twice. However, even this catch is not yet comparable to the quantities taken before the 1990s. Herring is mostly caught using trap nets. Herring catches were big in 2009 and 2010, but then declined for three consecutive years. The catch of 2013 fell short of the catches taken in the previous four years and was also lower than the average of the period 2007–2013. **Gibel carp** is caught mostly using gill nets. In 2013 the catch of this species declined slightly, but was still higher than the average of the period 2007–2013. Gibel carp dropped to fifth position in terms of catch volume and thus the years of rapid increase in the abundance of this species in the Väinameri Sea are over. The 2013 catch of **garfish**, which is mostly taken using trap nets, was the lowest of the last seven years and accounted for around half of the catch of 2012. The proportion of gill nets and trap nets is more or less equal in **roach** fishing, but the proportion of gill nets

has grown in the last three years. The roach catch of 2013 was the best of recent years. The **eel** catch, on the other hand, continued to decline in 2013.

In summary, catches taken in the Väinameri Sea were much lower in 2007 and 2008 than from 2009–2013. This is mainly due to better herring catches from 2009–2013. The highest total catch of the period 2007–2013 was taken in 2013. Even if the herring catch is not taken into account, the total catch of 2013 was a record high for the seven-year period.

Gulf of Riga

The most common fishing gear used in the Gulf of Riga (except Pärnu Bay) is gill nets and trap nets, with seines and longlines being used to a lesser extent. As in 2012, the biggest catches taken in the Gulf of Riga in 2013 were those of herring, followed by perch, roach and flounder (Table 11). Perch (around 386,000 euros) and herring (around 133,000 euros) produced the biggest sales revenues in 2013.

Herring is caught in the Gulf of Riga mostly with trap nets and less so with gill nets. The herring catch of 2013 was the lowest of the period 2007–2013 and accounted for less than half of the average. Gill nets are preferred in **perch** fishing, but considerable quantities are also caught using trap nets. While catches declined in 2011 and 2012, the quantity landed in 2013 reached the level of 2009. Unlike in previous years, gill nets were preferred in **roach** fishery in 2012 and 2013. The roach catch taken in 2013 fell short of the average of preceding years. **Flounder** is mostly caught with trap nets in the Gulf of Riga, but in 2010, 2011 and 2013 considerable quantities were also taken with seine nets. Flounder catches decreased in both 2011 and 2012, but increased again in 2013, exceeding the average of the past seven years. According to official statistics, **ruff** is mainly caught with gill nets, particularly near the island of Kihnu. Trap nets are used on a much smaller scale. The ruff catch of 2013 was meagre. Nets with the permitted mesh size should not catch too much ruff. The by-catch of ruff indicates, however, that nets with a smaller than permitted mesh size are used in perch fishery. The rapid increase in the abundance (yield) of **Gibel carp** is likely to have come to a halt in the Gulf of Riga, as catches of this species have not grown significantly in recent years. In **pike** fishing the prevalence of gill nets observed in 2012 was replaced by a preference for trap nets in 2013. Pike catches have increased during the last four years and the catch of 2013 was the highest of the last seven years. **Vimba bream** is caught mainly with gill nets, and on a considerably smaller scale also with trap nets. The vimba bream catch taken in 2013 was the highest in recent years. **European whitefish** is caught in the Gulf of Riga mostly with gill nets. The catch of 2013 was significantly higher than in the previous three years, but still remained below the average of the seven-year period. **Eel** catches are declining steadily in the Gulf of Riga, as in other areas.

In summary, the total catch taken in the Gulf of Riga in 2013 was the lowest of the seven-year period. If herring is not taken into account, the largest quantity of fish was caught in 2009. The total catch of 2013, excluding herring as the mass fish, was still higher than in the previous three years and also exceeded the average of the period 2007–2013.

Table 8. **Species composition and catches (kg) of commercial fishing in Gulf of Finland (ICES subdivision 32) by coastal fishing gear type, 2007–2013**

Species	2007	2008	2009				2010			
	Total	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total
Perch	36 000	77 005	34 681	37 753	29	72 463	16 598	33 467		50 066
Eel	2 444	2 113	1 696	21	4	1 721	1 317	54	2	1 373
Eelpout	48	1	15	2		18	7	2		9
Atlantic mackerel								1		1
Grayling				1		1				
Pike	1 664	1 564	161	1 176		1 337	225	1 540		1 766
Gibel carp	5 260	5 926	470	4 128		4 598	947	3 575		4 522
Brown trout										
Lamprey	46									
Turbot	12	32	11	42		53	22	50		73
Carp		1		8		8	8	8		16
Ruff	97	157	2	180		182	24	17		41
Sprat		213	80	1		81	2			2
Crucian carp			5	85		90	219	873		1 092
Pikeperch	2 420	11 222	555	418		973	579	446		1 025
Bream	2 970	3 032	948	884		1 831	600	317		918
Flounder	104 306	86 139	5 120	96 368	69	101 557	7 535	88 313	20	95 867
Tench	5	4	4	75		79	115	29		144
Burbot	92	48	5	18		22		10		10
Salmon	3 822	4 108	609	3 002		3 611	614	1 879		2 493
Sea trout	13 189	8 271	446	8 609		9 055	1 143	8 040		9 182
Four-horned sculpin		9						31		31
Longspined bullhead										
European whitefish	21 758	23 112	797	14 176		14 973	727	10 064		10 791
Smelt	15 527	21 777	530	20 309		20 838	427	9 404		9 831
Lumpfish								1		1
Sabre carp								1		1
Silver bream	855	786	539	452		991	332	150		482
Thicklip grey mullet										
Rudd	24	68	14	10		24	235	4		239
Herring	613 002	555 992	1 132 459	7 511		1 139 971	1 095 423	3 031		1 098 454
Ide	213	403	60	250		310	50	158		208
Roach	2 662	2 817	1 246	3 525		4 771	1 785	1 043		2 828
Dace		1								
Cod	86	854	8	1 872	2	1 882	67	2 057		2 124
Garfish	9 567	1 349	6 535	194		6 729	13 092	68		13 160
Bleak	44	62	27			27	29	2		31
Rainbow trout	110	224	8	173		181	2	74		76
Vimba bream	4 000	2 991	1 123	695		1 818	915	699		1 613
Twaite shad								13		13
Round goby	89	364	22	464	6	492	235	878	8	1 121
Total	**840 312**	**810 644**	**1 188 172**	**202 403**	**110**	**1 390 684**	**1 143 273**	**166 298**	**30**	**1 309 600**

Source: MoA

Pärnu Bay

Fishing gear used in Pärnu Bay includes gill nets, trap nets, seines and longlines. From 2011–2013 the biggest catches were produced by herring, followed

	2011				2012				2013				2007 –2013 Average
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	
	16 598	20 544		37 142	11 289	13 103		24 392	26 709	41 733		68 441	52 216
	760	10	1	772	646	14		660	601	9		609	1 384
	3	8		11	15	1		16	30	20		49	22
	1			1					<1			<1	<1
													<1
	280	1 764		2 043	360	1 989		2 349	665	2 319		2 984	1 958
	294	4 311	4	4 609	1 142	6 947		8 089	802	6 131		6 933	5 705
						5		5					1
		14		14		3		3					9
	1	10		11	1	34		35		16		16	33
		11		11		23		23		13		13	10
	68	61		129	93	127		220	31	154		185	144
	599			599	12	12	10	34	802			802	247
		41		41	6	213		218					206
	260	4 362		4 622	119	579		697	981	1 146		2 127	3 298
	445	409		855	310	604		914	426	526		952	1 639
	4 950	78 438	2	83 390	4 655	62 883		67 538	5 705	69 456	35	75 195	87 713
	78	34		112	49	13		62	7	6		13	60
	5	7		12	7	19		26	4	36		40	36
	371	2 330		2 701	779	2 724		3 504	1 139	4 136	6	5 281	3 658
	1 558	8 296		9 854	924	9 774		10 698	692	8 274	2	8 968	9 888
		11		11	11	56		67		26		26	21
		2		2									<1
	530	8 322		8 852	428	10 976		11 404	690	13 314		14 004	14 985
	128	3 511		3 639	427	11 664		12 090	1 096	14 156		15 252	14 136
													<1
													<1
	58	448		506	345	182		527	1 007	66		1 073	746
						2		2					<1
	415	92		507	125	317		442	12	70		82	198
	799 189	1 912		801 101	696 207	2 274	5	698 486	979 782	2 756		982 538	841 363
	88	39		127	7	58		64	11	83		94	203
	1 096	2 906		4 002	642	2 470		3 112	665	1 583		2 249	3 206
													<1
	11	2 054		2 065	20	1 431		1 451	17	2 387		2 404	1 552
	11 067	126		11 194	5 061	72		5 134	664	1		665	6 828
	27			27	57	70		127	38	14		52	53
	3	82		85	3	36		38	9	33		42	108
	420	927		1 347	107	1 169		1 277	240	1 076		1 316	2 052
						6		6					3
	3 557	485	9	4 051	16 026	783		16 809	7 528	1 038		8 565	4 499
	842 860	**141 566**	**16**	**984 442**	**739 873**	**130 628**	**15**	**870 516**	**1 030 351**	**170 575**	**43**	**1 200 969**	**1 058 167**

by perch, smelt, pikeperch, vimba bream and ruff (Table 12). Whereas in 2012 herring generated the biggest sales revenue, in 2013 the most profitable species was perch (around 1,386,000 euros), placing herring in second position (around 1,237,000 euros). Sales revenues generated by pikeperch and smelt underwent

Table 9. Species composition and catches (kg) of commercial fishing in Central Baltic (ICES subdivisions 28.2 and 29.2) by coastal fishing gear type, 2007–2013

Species	2007	2008	2009					2010				
	Total	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total
Perch	3 525	1 974	1 300	3 757	80	2	5 139	1 058	2 672	115	30	3 875
Eel	759	456	520	6		34	560	381	2		9	391
Eelpout	19	6	22	2			24	19				19
Pike	1 453	1 470	548	653			1 201	1 008	1 214		20	2 242
Gibel carp	1 902	1 008	464	1 189			1 652	815	751		14	1 580
Turbot				1			1	25	84			109
Carp	13											
Ruff	41	25	39	4			43	11	12			23
Sprat	<1		15				15					
Crucian carp												
Pikeperch	1	2										
Bream	7	1	1	3			4	2				2
Flounder	181 186	160 621	9 636	100 758	50 888	9	161 291	8 618	83 272	51 916	71	143 877
Tench	106	3	8	2			10	11	13		7	31
Burbot	1 186	536	460	200			660	392	271		10	674
Salmon	900	781	14	957			971	12	369			381
Sea trout	3 193	2 831	93	3 808			3 900	117	1 863			1 979
Four-horned sculpin	7	4		5			5					
European whitefish	2 567	2 203	24	1 375			1 399	25	1 183			1 208
Smelt	2	30		3			3		7			7
Lumpfish	1	2										
Sabre carp									1			1
Silver bream	20		<1	93			93					
Thicklip grey mullet	3											
Rudd	69	29	20	1			21	30	9			39
Herring	6 778	7 351	10 875	3 763			14 638	5 728	1 895		22	7 645
Gudgeon												
Ide	1 877	3 614	566	1 987		11	2 564	741	1 849	8	32	2 629
Roach	5 365	5 085	2 700	1 780	720		5 199	3 965	1 751		13	5 729
Dace	<1											
Cod	579	1 028	207	1 472			1 679	199	909			1 108
Garfish	16 379	9 325	6 270	310		12	6 592	7 827	253		10	8 090
Bleak	17	30	12	2			13	38	7			45
Rainbow trout	77	85	13	48			61	3	14			18
Vimba bream	4	4		9			9	5	7			12
Twaite shad	1							11	1			12
Round goby												
Total	**228 034**	**198 504**	**33 805**	**122 187**	**51 688**	**68**	**207 747**	**31 040**	**98 409**	**52 039**	**238**	**181 725**

Source: MoA

major changes: that produced by pikeperch decreased from around 535,000 euros in 2012 to around 344,000 euros in 2013, but the figure for smelt rose from 229,000 euros to 490,000 euros. In terms of catch volumes and sales revenue, Pärnu Bay is undeniably the most important coastal fishing area in Estonia.

Herring is caught mainly using trap nets and its catches fluctuated greatly in the period 2007–2013. The herring catch of 2013 was lower than in the preceding five years and remained below the average of the seven-year period. Catches

2011					2012					2013					2007 –2013 Average
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	
2 124	8 936		3	11 063	1 673	4 272			5 945	4 986	16 221	1 475	13	22 695	7 745
254			5	259	347				347	249	2			251	432
1				1	3				3	23				23	14
1 185	1 472		5	2 661	758	595			1 353	1 864	1 857			3 721	2 014
968	2 010			2 978	947	2 178			3 124	698	1 713			2 412	2 094
	91			91		47			47	4	16			20	38
	15			15											4
87	55			142	132	2			135	594	109			703	159
8	15			23							5			5	6
						<1			<1						<1
	1			1						10	5			15	3
3	124			127	1				1	3	2			5	21
14 139	92 284	29 850	2	136 275	8 085	77 935	36 810	1	122 831	9 669	85 983	49 968	<1	145 620	150 243
16	204			220	7	23			29	32	13			45	63
613	399			1 012	420	84			504	508	57		2	567	734
8	359			366	6	521			527	18	440			458	626
141	2 237			2 378	70	4 447	40		4 557	106	3 524			3 630	3 210
	1			1						<1	5			5	3
22	2 013			2 036	182	2 476			2 658	273	4 386			4 658	2 390
	14			14	2				2						8
	1			1							1			1	1
															<1
	5			5	<1	190			190	141	2			143	64
										2				2	1
87	94			181	193	90			283	51	28			79	100
3 418	1 846			5 264	6 123	3 468			9 591	11 503	1 835			13 337	9 229
1				1											<1
827	2 820			3 646	571	1 683			2 253	889	2 877		2	3 768	2 907
3 335	3 584			6 919	3 071	2 197			5 269	3 277	1 560			4 837	5 486
															<1
258	819		13	1 089	251	1 208			1 460	363	1 550			1 913	1 265
4 559	427			4 986	1 865	298		27	2 190	1 955	250			2 204	7 109
2	5			7	9	1			10	13				13	19
8	27			35	12	19			31	73	48			120	61
21	34			55	<1	7			7	19	17			36	18
															2
						1			1	10				10	2
32 081	**119 891**	**29 850**	**28**	**181 850**	**24 727**	**101 742**	**36 850**	**28**	**163 347**	**37 332**	**122 504**	**51 443**	**17**	**211 296**	**196 072**

depend on coastal fishing quotas as well as on the weather prevailing in the fishing period. Trap nets and gill nets are used in equal shares in **perch** fishing. The perch catch of 2013 was the highest for the entire period.

Catches of **smelt** increased in both 2012 and 2013 compared to 2011, when the catch was extremely low. In addition to the state of stocks, commercial fishing catches of smelt during the spawning period also depend to a great extent on the hydro-meteorological conditions (including ice conditions) prevailing at the time of fishing.

Table 10. Species composition and catches (kg) of commercial fishing in Väinameri Sea (ICES subdivision 29.4) by coastal fishing gear type, 2007–2013

Species	2007	2008	2009				2010			
	Total	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total
Perch	20 673	11 608	2 519	12 038	14	14 571	3 737	19 847	72	23 655
Eel	662	662	432	9	6	447	380		5	384
Eelpout	10	14					19			19
Pike	7 787	8 449	2 791	5 017		7 808	4 463	7 770	18	12 251
Gibel carp	17 115	24 922	3 965	15 362		19 328	4 571	17 419	1	21 990
Turbot										
Carp	19	38	16	24		40	22	2		24
Ruff	4 497	4 433	1 081	148		1 228	712	88	11	811
Sprat	25	21		7		7	50	18		68
Pikeperch	132	128	12	127		139	127	262		388
Bream	418	244	84	109		193	110	206		316
Flounder	8 667	8 358	2 321	7 892	1	10 215	2 412	8 827	21	11 260
Tench	1 819	1 682	1 143	608		1 751	1 075	207		1 282
Burbot	1 253	503	178	318		496	94	331		424
Salmon	100	106	8	124		132	31	90		121
Sea trout	313	212	37	258		295	2	244		246
European whitefish	3 227	1 998	49	1 870	10	1 930	70	1 339		1 408
Smelt	1 057	497	279	26		305	129	38		167
Silver bream	9 449	8 888	1 493	6 616		8 109	1 550	6 254		7 804
Stickleback	213	8								
Rudd	1 988	1 365	484	507		991	498	416		914
Herring	42 896	38 191	216 230	3 322		219 552	228 994	2 430	8	231 432
Ide	6 747	6 696	2 358	3 080	3	5 440	1 702	1 520	18	3 241
Roach	14 639	13 781	6 215	7 492	2	13 709	5 915	7 774	10	13 699
Dace		3								
European chub		15		20		20				
Cod	6	7	3	39		42	5	51		56
Garfish	38 570	21 353	19 297	1 152	36	20 485	19 292	246	63	19 601
Bleak	116	55	31			31	33			33
Rainbow trout	10		4	2		6				
Vimba bream	1 255	827	713	1 225		1 938	778	2 285		3 063
Twaite shad										
Round goby										
Total	**183 659**	**155 061**	**261 741**	**67 391**	**72**	**329 204**	**276 767**	**77 663**	**226**	**354 656**

Source: MoA

Unlike the Gulf of Finland, where gill nets represent the main fishing gear, in Pärnu Bay almost all of the smelt catch is taken using trap nets. **Garfish** is mostly caught using trap nets as well. The largest garfish catch in the period 2007–2013 was taken in Pärnu Bay in 2011 (49,349 kg). The catches of 2012 and 2013, however, were very small (127 and 658 tonnes, respectively) because garfish could no longer be fished after the herring quota was exhausted.

In summary, catches taken from Pärnu Bay in the period 2007–2013 fluctuated significantly. The total catch of the last four years is lower than the average catch of the years 2007–2013. The total catch is 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 2013 was the highest in the period.

	2011				2012				2013					2007 –2013 Average
	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	
	2 234	14 965	9	17 208	7 458	25 041	22	32 521	41 026	111 009	10	17	152 062	38 900
	264	26	3	293	169	2		171	122	1			123	392
					2			2						6
	5 069	14 127		19 196	6 865	17 329		24 194	14 196	29 066			43 262	17 564
	3 983	19 859	5	23 847	5 802	19 813		25 615	4 007	19 131			23 138	22 279
									1	3			4	1
		1		1	17	6		23	23	3			26	24
	1 269	200		1 469	3 847	147	1	3 994	4 107	569			4 676	3 015
		11		11		2		2	30	2			32	24
	99	378		477	80	314	1	395	3 014	5 021			8 034	1 385
	409	385		794	426	57		483	381	650			1 031	497
	1 352	7 453		8 805	2 732	6 346	1	9 080	2 682	5 450			8 131	9 216
	1 272	198		1 470	2 118	204		2 321	2 171	515			2 686	1 859
	153	194		347	412	468		880	512	1 257			1 768	810
		56		56	40	189		229	8	119			127	124
	17	419		436	45	689		734	27	672			698	419
	30	1 981		2 011	31	2 683		2 714	47	2 803			2 850	2 305
	27	9		36	77	4		81	40	20			60	314
	1 043	9 078		10 121	1 662	13 236	4	14 902	4 168	13 228			17 396	10 952
														32
	1 006	737		1 743	306	593		899	622	968			1 590	1 356
	178 818	2 885		181 703	139 637	2 998		142 635	130 842	1 665	650		133 157	141 366
	1 007	1 261		2 267	775	1 327	5	2 107	947	2 137		2	3 086	4 226
	7 692	11 342		19 034	6 881	12 477	1	19 359	7 882	15 438			23 320	16 792
									3				3	1
										14			14	7
	12	47		59	12	43	3	58	5	74			78	44
	30 303	691	10	31 004	8 246	379	80	8 705	3 649	396		43	4 088	20 543
	27			27	131	51		182						63
		8		8										3
	754	3 023		3 777	725	3 196		3 921	1 223	4 546			5 769	2 936
		1		1										<1
						13		13		<1			<1	2
	236 839	**89 335**	**27**	**326 201**	**188 493**	**107 606**	**118**	**296 216**	**221 730**	**214 757**	**660**	**62**	**437 209**	**297 458**

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 type, 2007–2013

Species	2007	2008	2009					2010				
	Total	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total
Perch	210 374	183 475	7 117	205 980		1 193	214 290	7 300	180 523		136	187 959
Eel	2 044	1 703	1 440	15		4	1 459	1 219	1		10	1 230
Eelpout	73	92	29				29	2				2
Pike	2 266	2 874	1 585	957			2 542	3 049	1 785			4 834
Gibel carp	9 113	9 187	2 023	2 845			4 868	2 618	2 287			4 904
Lamprey				2			2	4				4
Carp	144	30	7	10			17		6			6
Ruff	4 278	6 721	867	10 870			11 737	242	10 093			10 335
Sprat	42			8			8	50	30			80
Crucian carp			409	5 703			6 112	399	3 315			3 714
Pikeperch	1 962	1 585	217	465		2	683	61	950			1 011
Bream	22	205	13	62			75	25	24			49
Flounder	20 365	20 222	8 974	4 089		26	13 089	7 861	5 289	4 050	5	17 204
Tench	88	292	304	191			494	536	260			796
Burbot	511	164	155	4			159	143	29			171
Salmon	609	453	70	541			611	63	678			741
Sea trout	399	605	144	544			688	63	721			784
Four-horned sculpin		1		1			1					
European whitefish	2 111	2 142	13	3 602			3 615	5	1 281			1 286
Sea lamprey	1											
Smelt	773	1 413	5 308	116			5 424	1 011	87			1 098
Lumpfish		1										
Silver bream	429	380	153	43		22	218	227	205		7	439
Stickleback		9	40				40					
Rudd	98	21										
Herring	1 174 349	1 636 331	1 353 088	3 681			1 356 769	1 555 136	15 626			1 570 761
Ide	289	292	129	288			417	110	109			219
Roach	21 293	18 372	10 868	6 273	6 700	16	23 857	15 297	4 941	11 400	7	31 645
Dace	12							2				2
Cod	163	502	210	115			324	220	171			391
Garfish	26 709	39 721	22 338	164		25	22 527	23 763	122		122	24 007
Bleak	12	6	28	10			38					
Rainbow trout	12	14	3	3			6					
Vimba bream	4 267	3 113	188	2 835			3 023	148	3 040			3 188
Twaite shad	1											
Round goby				<1			<1					
Total	**1 482 806**	**1 929 922**	**1 415 716**	**249 414**	**6 700**	**1 288**	**1 673 118**	**1 619 551**	**231 571**	**15 450**	**287**	**1 866 859**

Source: MoA

2011					2012					2013					2007 –2013 Average
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	
25 668	140 799		18	166 484	17 964	129 080	15	1 024	148 083	25 028	186 807		207	212 042	188 958
795	2			797	600			3	603	532	7			539	1 196
29	1			30	2				2	10				10	34
3 695	2 746			6 440	2 856	3 572		26	6 454	5 044	4 921			9 964	5 054
2 561	5 512			8 073	2 860	6 011		55	8 925	3 090	6 240			9 329	7 771
					10				10						2
1	8			9						3	8			11	31
199	7 277			7 476	3 738	4 236	2		7 976	471	4 240			4 711	7 604
	10			10		105			105	3	333			336	83
64	752			816	224	1 167			1 391	54	1 045			1 099	1 876
190	4 027			4 217	53	2 504		43	2 600	83	2 552		17	2 652	2 101
128	86			214	157	93			250	73	99			172	141
8 931	4 578	1 773		15 282	8 647	3 012	720	24	12 403	11 103	5 210	2 312	12	18 637	16 743
1 042	61			1 103	373	528			901	860	332			1 192	695
217	13			230	192	24			216	293	34			327	254
53	467			520	48	751			799	32	226			257	570
98	645			743	153	987			1 140	167	940			1 107	781
	12			12		1			1						2
53	900			953	20	1 605			1 625	16	1 806		6	1 827	1 937
															<1
529	25			554	376	20			396	845	57			902	1 508
															<1
235	233		15	483	114	307			421	182	149			331	386
42				42											13
										2				2	17
1 307 801	18 640			1 326 441	752 869	40 490			793 359	559 673	20 395			580 067	1 205 439
45	44			89	10	34			44	44	53			97	207
15 661	10 258		15	25 933	12 834	13 647		19	26 501	8 978	10 917			19 895	23 928
	1			1											2
118	154			272	193	250			443	483	321			804	414
21 102	106			21 208	8 725	152		5	8 882	11 407	114			11 521	22 082
					21				21	30				30	15
	11			11							32			32	11
131	2 845			2 976	147	3 440			3 587	267	5 807			6 074	3 747
															<1
					87	1			88	504	2			506	85
1 389 386	**200 210**	**1 773**	**48**	**1 591 418**	**813 272**	**212 015**	**737**	**1 199**	**1 027 223**	**629 273**	**252 644**	**2 312**	**242**	**884 472**	**1 493 688**

Table 12. Species composition and catches (kg) of commercial fishing in Pärnu Bay (fishing squares 178–180) by coastal fishing gear type, 2007–2013

Species	2007	2008	2009					2010					
	Total	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	Trap nets	Gill nets	Seine nets	Long-lines	Total	
Perch	506 183	429 190	228 104	277 733	2	159	505 998	300 921	312 564	19	228	613 732	
Eel	198	148	115				115	72			2	74	
Eelpout	4	60	44	3			47	762	3			765	
Pike	531	1 436	338	129			466	1 035	667			1 702	
Gibel carp	23 217	18 576		8			8						
Lamprey	505	17	148				148	567				567	
Carp	60	272	10	124			134	11	82			93	
Ruff	7 967	8 715	9 562	3 706			13 268	12 204	8 933			21 137	
Crucian carp			5 404	7 818		5	13 227	4 706	8 810			13 516	
Pikeperch	94 666	51 084	40 426	24 538		4	64 969	34 119	36 744		82	70 946	
Bream	5 609	3 740	2 102	309			2 411	2 031	260			2 291	
Flounder	1 327	1 186	1 202	581			1 783	898	689			1 587	
Tench		13	1	13			14	2	36			38	
Burbot	23	8	13				13	19	2			21	
Salmon	18	141	44	32			76	29	30			59	
Sea trout	8	8	20				20	13				13	
Four-horned sculpin		1											
European whitefish	1 090	391	96	631			727	36	817			853	
Sea lamprey								31				31	
Smelt	463 585	625 661	719 927	25 675			745 601	402 649	1 428			404 077	
Silver bream	28 015	23 081	11 265	2 302	4		13 570	10 397	2 474	3		12 874	
Stickleback								11		5		16	
Rudd	3		7				7						
Herring	4 627 555	8 339 085	9 030 925	43			9 030 968	6 328 126	246			6 328 372	
Ide	48	8		5			5	6	2			8	
Roach	18 900	11 017	9 018	1 682			10 700	10 533	2 131			12 664	
Dace													
Cod	1	9		3			3	12	3			15	
Garfish	18 308	10 190	14 689	115			14 804	21 168	20			21 188	
Bleak		10											
Vimba bream	25 801	25 214	11 182	5 223			16 405	16 604	5 338			21 942	
Lesser sand eel		80											
Total	**5 823 620**	**9 549 339**	**10 084 638**	**350 672**	**6**	**168**	**10 435 484**	**7 146 962**	**381 279**	**27**	**311**	**7 528 579**	

Source: MoA

2011					2012					2013					2007 –2013 Average
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	
391 777	172 031	31	479	564 317	185 925	151 691		1 291	338 907	458 026	302 647	62	871	761 605	531 419
84	2			86	108			20	128	116	15		1	132	126
50				50	366	6			372	1 072				1 072	339
1 185	537			1 722	584	473			1 057	3 795	2 140		34	5 969	1 840
2 163	5 969			8 131	9 539	4 383			13 922	7 900	3 432			11 332	10 741
868	3			871	348	1			349	996				996	493
11	35			46	16	62			78	41	205			246	133
41 184	10 398			51 582	34 744	4 111			38 855	24 009	4 479			28 488	24 287
3 781	865			4 645	3 607	1 917		350	5 874	510	1 779		13	2 302	5 652
48 233	52 699	135	133	101 200	36 289	104 794		2 057	143 140	51 278	55 547		2 502	109 327	90 762
5 240	324			5 564	9 091	359			9 450	5 997	613		2	6 612	5 097
887	304			1 191	1 024	188		20	1 232	1 584	800		21	2 405	1 530
45	12			57	8				8	8	60			68	28
19				19	34	2			36	92	9			101	32
102	32			134	311	11			322	653	47			700	207
3				3	101	31			132	256	8			264	64
															<1
53	731			784	656	1 397			2 053	205	2 209			2 414	1 187
															4
115 864	257			116 121	285 340	381			285 721	489 218	979			490 197	447 280
9 795	1 615			11 410	16 335	868		12	17 215	10 917	1 037		13	11 967	16 876
															2
													8	8	3
6 282 647	110			6 282 757	5 444 736	140			5 444 876	5 378 563	107			5 378 670	6 490 326
										1				1	10
23 662	3 695			27 356	21 544	1 998		14	23 556	18 872	1 855		54	20 781	17 853
20	1			21											3
3	7			10	2	7			9	25	32			57	15
49 137	212			49 349	11	116			127	658				658	16 375
															1
32 022	9 905			41 927	31 737	12 731			44 468	28 201	15 011		7	43 219	31 282
		52		52			192		192			735		735	151
7 008 832	**259 742**	**218**	**612**	**7 269 403**	**6 082 456**	**285 665**	**192**	**3 764**	**6 372 076**	**6 482 993**	**393 010**	**797**	**3 526**	**6 880 325**	**7 694 118**

TRAWL FISHERY IN THE BALTIC SEA

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

Herring, sprat and cod are internationally regulated/managed 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* L.) 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 spawn from March to June, and autumn-spawning herring, which spawn in August and September and whose proportion has been less than 5% since 1970s in all areas. In recent years, however, the share of autumn-spawning herring has slightly increased e.g. on the south coast of the island of Saaremaa and in spawning grounds in the north-east part of the Gulf of Riga.

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.

Unlike sprat, which is treated as a single stock unit i.e. population across the Baltic Sea, in the case of herring the state of stocks is assessed and advice for exploitation is given for four stock units (Figure 6):

- Central Baltic herring (subdivisions 25–28.2, 29 and 32);
- Gulf of Riga herring (subdivision 28.1);
- Bothnian Sea herring (subdivision 30); and
- Bothnian Bay herring (subdivision 31).

The Gulf of Riga and the Bothnian Sea (and possibly also the Bothnian Bay) are inhabited by local natural herring populations, but Central Baltic herring (in

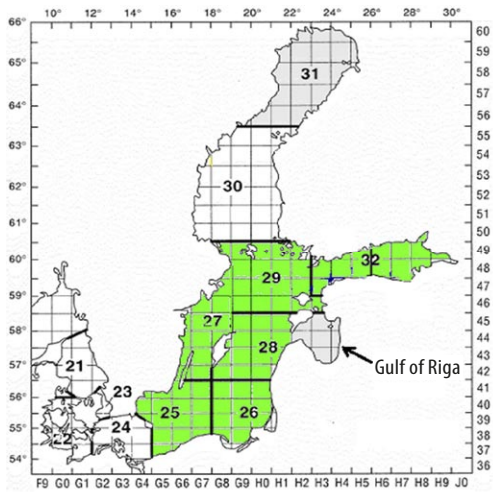


Figure 6.
Agreed stock and management units for herring in Baltic Sea:
- Central Baltic herring (also referred to as open sea herring) (ICES subdivisions 25–29 and 32; green in figure)
- Gulf of Riga herring (subdivision 28.1)
- Bothnian Sea herring (subdivision 30)
- Bothnian Bay herring (subdivision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

Source: ICES 2013

subdivisions 25–28.2, 29 and 32) comprises different populations (Gulf of Finland herring, Swedish coast herring *et al.*).

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

Central Baltic herring (subdivisions 25–28.2 and 32)

From a low of 92,000 tonnes in 2005, the herring catch taken from the Central Baltic increased to 137,000 tonnes in 2010, but decreased to 101,000 tonnes in 2013 according to official data. The decline in the catch was due to the reduction of the total allowable catch (which in 2013 amounted to 90,000 tonnes, not counting the portion of Russia). As in previous years, Sweden (27%), Poland

Table 13. Central Baltic herring: catches by country (10^3 t), 1977–2013

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**
2013*	**3.4**	**12.6**	**18.2**	**1.4**	**3.5**	**1.7**	**20.6**	**10.0**	**29.5**	**101.0**

* Data for 2013 are preliminary and subject to change.

Source: ICES 2014

(26%) and Finland (18%) landed the largest catches in 2013. Estonia's catch was 12,600 tonnes, which accounted for 12% of the total catch (Table 13).

In terms of catch weight, the most of 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: age groups 1–3 prevail, representing around 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 stability of age composition has been observed in herring catches, which is due to a smaller variation in the strength of herring year classes.

Figure 7.
Central Baltic herring: proportion of catch in weight and numbers by subdivision in 2013
Source: ICES 2014

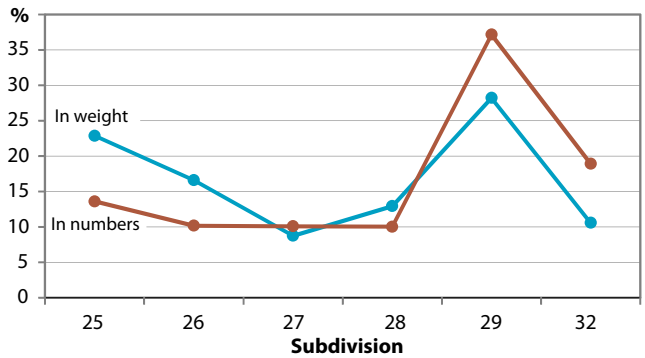


Figure 8.
Central Baltic herring: average age composition of catches, 1974–2013
1: age 1
2: age 2 etc.
6+: age 6 and older
Source: ICES 2014

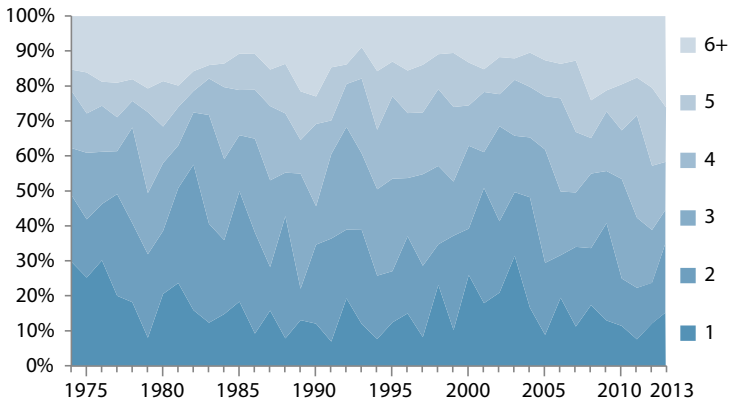
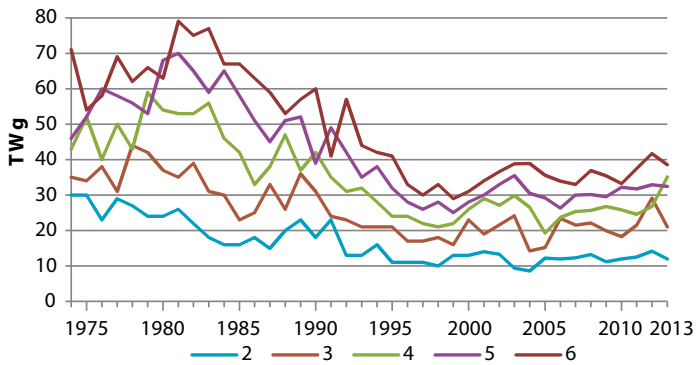


Figure 9.
Central Baltic herring: dynamics of mean body weight of herring aged 2–6, 1974–2013
Source: ICES 2014



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 2006 (Figure 9).

According to the latest estimate, at the beginning of 2014 the spawning stock biomass of the Central Baltic herring amounted to 852,165 tonnes or 91% of the 1974–2013 average (935,530 tonnes) (Figure 10). This relatively low SSB in recent decades is explained by poor individual growth, as well as by a lower abundance of recent year classes compared to earlier times. 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 those of 2007 and 2011 (Figure 11). Therefore, in recent years the stock has increased mainly as a result of the decline in fishing mortality. The outlook for the coming years depends on the abundance of cohorts of 2010–2014, which will account for most of the catch in the period 2014–2016, 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:

1) precautionary fishing mortality rate F_{PA} = 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.

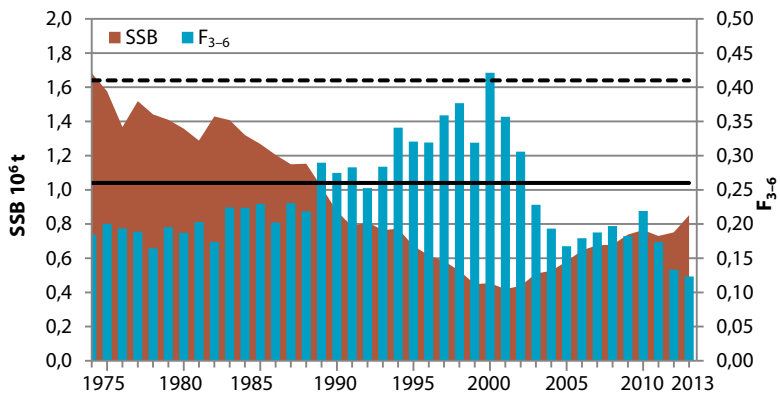


Figure 10. Central Baltic herring: spawning stock biomass (SSB) and fishing mortality in age groups 3–6 ($F_{3–6}$), 1974–2013
The horizontal line represents the level of F_{MSY} = 0.26 and the dotted line indicates the sustainable mortality rate F_{PA} = 0.41.
Source: ICES 2014

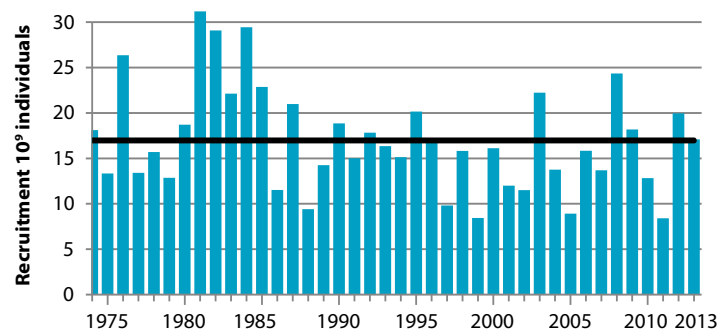


Figure 11. Central Baltic herring: dynamics of abundance of recruitment (age 1), 1974–2013
The horizontal line marks the long-term average.
Source: ICES 2014

Actual fishing mortality has been lower than F_{MSY} since 2003. Looking at herring fishing mortality in the Central Baltic since 1974, there appears to be a period of particularly high mortality (1994–2002) when the actual mortality rate significantly exceeded the recommended level (Figure 10).

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 2015, which translates to catches of up to 193,000 tonnes, or 91% more than in 2013 (EU TAC_{2014} = 113,000 tonnes).

The European Commission's Scientific, Technical and Economic Committee for Fisheries (STECF) agreed with the advice of the ICES, but noted that it pertained to stocks from which the catches of open sea herring traditionally taken from the Gulf of Riga should be excluded and in which the gulf herring caught in the Central Baltic should be included. The STECF therefore suggests that under the MSY approach the total allowable catch of herring in subdivisions 25–28.2, 29 and 32 in 2015 be no more than 188,520 tonnes (Raid and Doerner 2014).

Gulf of Riga herring

Gulf of Riga herring are only fished 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 (around 10–20%) was not reflected in official statistics until 2010. All of the herring caught by Latvian fishermen have been included in catch statistics since 2011 (Table 14).

In addition to local gulf herring, catches also include Central Baltic herring that 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 compared to the early 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 the year classes 1996–2006. Only the strength of the cohorts that were born after the cold winters of 1996, 2003 and 2006 was equal to or lower than 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 those of 2008 and 2009 were close to the long-term average, that of 2010 proved weak and that of 2011

Table 14. Gulf of Riga herring: Estonian, Latvian and unreported landings (t), 1991–2013

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	18 323	1 832	37 322
2010	15 422	17 751	1 775	34 948
2011	14 721	20 203	–	35 024
2012	13 789	17 944	–	31 733
2013	**11 898**	**18 462**	**–**	**30 360**

Source: ICES 2014

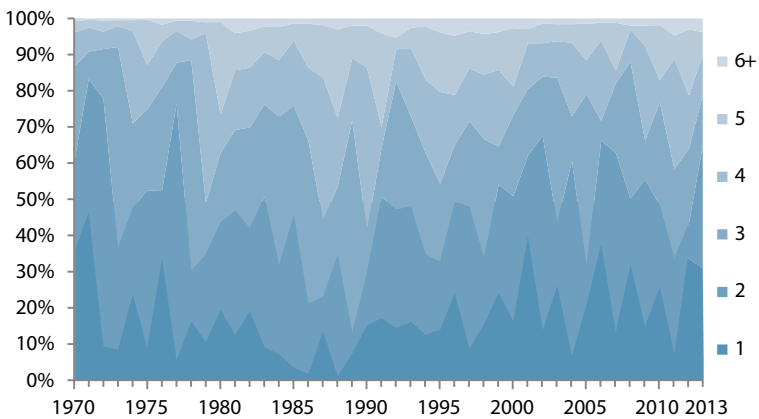


Figure 12. Gulf of Riga herring: average age composition of catches, 1970–2013
Source: ICES 2014

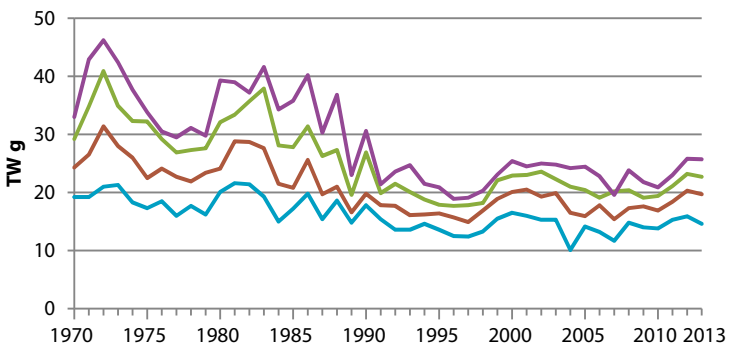


Figure 13. Gulf of Riga herring: dynamics of mean body weight of herring aged 2–5, 1970–2013
Source: ICES 2013

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. In early 2014, the biomass exceeded the long-term average by 16% (SSB_{2013} = 90,470 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 1990s, which is two times higher than in the 1970s and 1980s (ICES 2014). 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, high fishing mortality is a concern. This phenomenon can probably be explained by both body weight dynamics and the fact that some landings were not reported in previous years. (It is estimated that 10–20% of Latvia's landings remained unreported; see 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 F_{PA} 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 2015 should not exceed the level of F_{MSY} of 0.35. This implies that the total catch of Estonia and Latvia should not exceed 34,300 tonnes (for 2014 the ICES advised a catch of up to 25,800 tonnes).

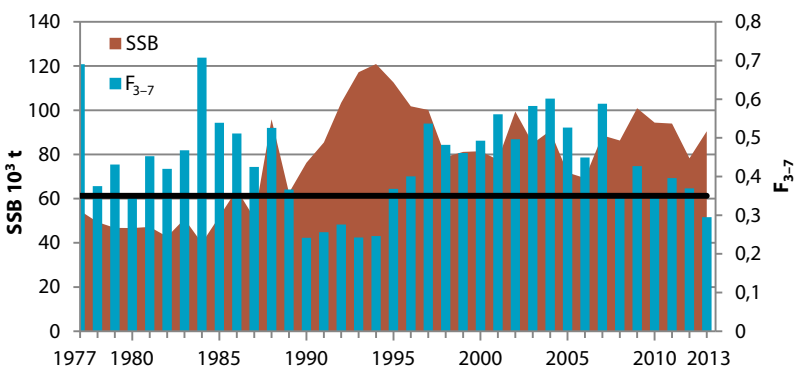


Figure 14.
Gulf of Riga herring: spawning stock biomass (SSB) and fishing mortality in age groups 3–7 (F_{3-7}), 1977–2013
The horizontal line represents the maximum sustainable exploitation intensity F_{MSY} = 0.35.
Source: ICES 2014

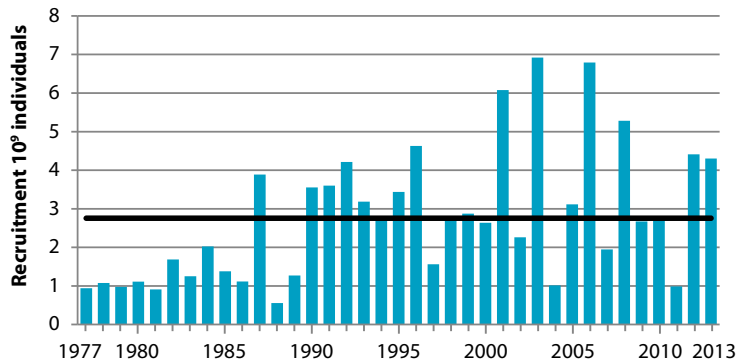


Figure 15.
Gulf of Riga herring: dynamics of abundance of recruitment (age 1), 1977–2013
The horizontal line marks the long-term average.
Source: ICES 2014

The STECF agreed with the advice of the ICES, noting that it only referred to gulf herring stocks and that the TAC should include the catches of open sea herring traditionally taken from the Gulf of Riga and exclude the average catches of gulf herring taken outside the Gulf of Riga. The STECF therefore suggests that the TAC of herring caught in the Gulf of Riga should be 38,780 tonnes in 2015 (TAC_{2014} = 30,700 tonnes, Raid and Doerner 2014).

The condition of Central Baltic herring and, to a lesser extent, possibly also of the Gulf of Riga herring 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. This would contribute to a reduction in the fishing mortality of both stock units, which in turn would create preconditions for increased fishing opportunities – provided, of course, that the recommended fishing mortality level is respected. Long-term dynamics indicate, however, that despite the high biomass of Gulf of Riga herring the fishing mortality of this stock unit has exceeded the F_{MSY} level for most of the last 37 years (Figure 14).

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 vegetation. Also, sprat is a so-called batch 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 the 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 its total catch, which has varied over the last 34 years from just 37,000 tonnes in 1983 to 529,000 tonnes in 1997 (Table 15). In the last five years the catches of Baltic sprat have ranged from 231,000 to 407,000 tonnes. The catch of 2013 was 272,400 tonnes, or 18% more than in 2012. Poland (26%), Sweden (16%) and Latvia (13%) have landed the largest sprat catches in the last three years. The catch of Estonian fishermen was just under 30,000 tonnes in 2013.

The stock and age composition of sprat is characterised by the dominance of younger age groups: the 1–2 age groups 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 correspond-

ing trend of herring in the 1990s and 2000s. However, the decline in the mean body weight of sprat was significantly lower compared to that of herring in the 1990s, and the mean body weight of sprats of the same age currently amounts to 70–75% of the figures from the first half of the 1980s. The data for 2012 and 2013 allow for a more optimistic projection: the mean body weight of sprat aged 2–5 has been increasing in the last two to three 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.

Table 15. Sprat catches in Baltic Sea by country (10^3 t), 1977–2013

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	0.2	56.7	19.5	56.2	**312.1**
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**
2013	**25.6**	**29.8**	**11.10**		**10.3**	**33.3**	**10.4**	**79.7**	**22.6**	**49.7**	**272.4**

* Until 1991, the Soviet Union

Source: ICES 2014

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, exceeding 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. The SSB declined from 2010 –2012 because of the weak year classes of 2004, 2007 and 2009 and due to high fishing mortality from 2002–2010 and in 2013 (Figures 18 and 19). At the beginning of 2014 the ICES estimated the SSB of sprat to amount to just over one million tonnes, which is 4% higher than the long-term average (Figure 18).

International acoustic surveys of pelagic fish stocks conducted in the Baltic Sea in recent years show that stocks have declined mainly in the southern part of the Baltic Sea and that the lion's share of stocks is now located in the central and north-eastern parts of the sea (ICES 2014, Figure 22). 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 2014 the ICES classified the current level of exploitation of the Baltic sprat stock as unsustainable, given that the fishing mortality rate for 2013 (0.35) exceeded both F_{MSY} (0.29) and F_{PA} (0.32) (Figure 18).

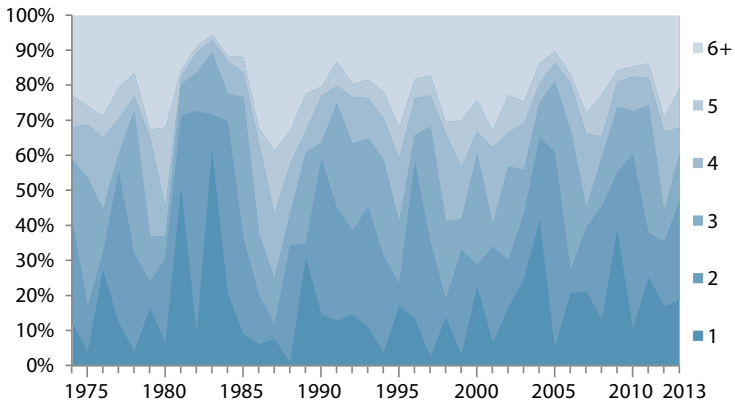


Figure 16.
Average age composition of sprat catches, 1974–2013
1: age 1
2: age 2 etc.
6+: age 6 and older
Source: ICES 2014

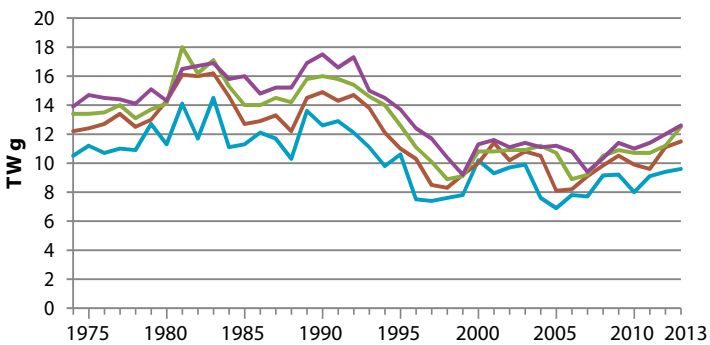


Figure 17.
Dynamics of mean body weight of sprats aged 2–5, 1974-2013
Source: ICES 2014

Figure 18.
Sprat spawning stock biomass (SSB) and fishing mortality in age groups 3–5 (F_{3-5}), 1974–2013
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 2014

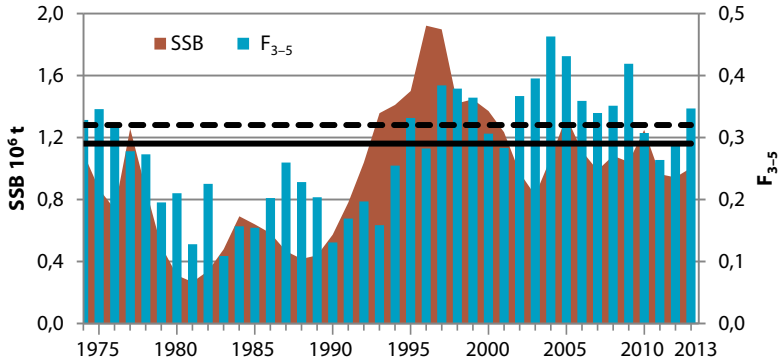


Figure 19.
Dynamics of sprat recruitment (age 1), 1974–2013
The horizontal line marks the long-term average.
Source: ICES 2014

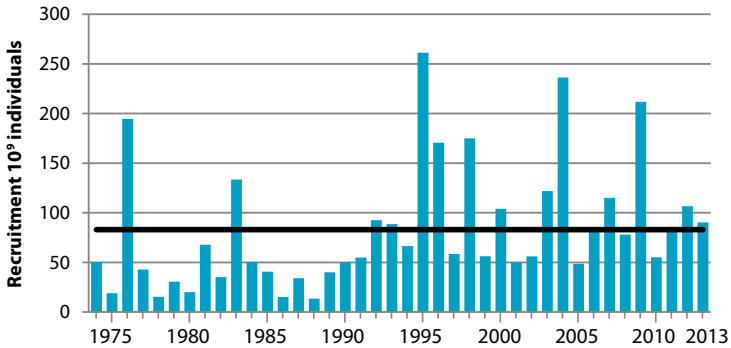


Figure 20.
Estimate of natural mortality of sprat in age groups 1–6 at different levels of Eastern Baltic cod spawning stock biomass, 1974–2013
Source: ICES 2014

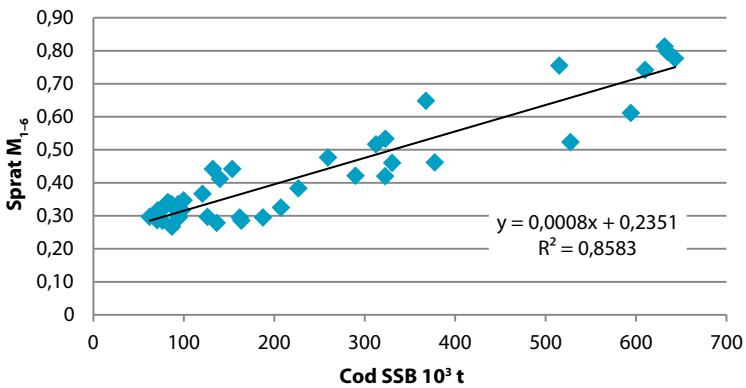
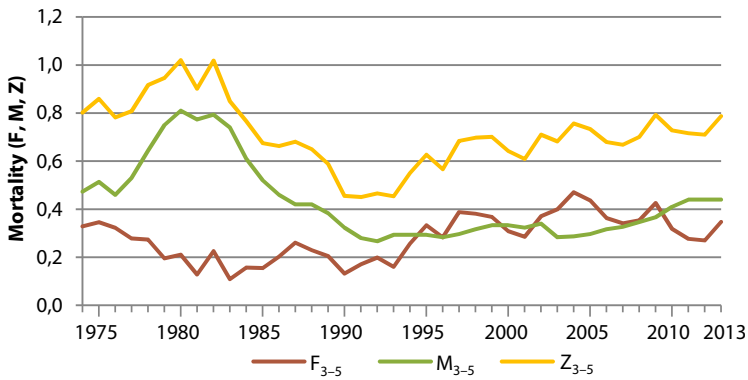


Figure 21.
Fishing mortality (F_{3-5}), natural mortality (M_{3-5}) and total mortality (Z_{3-5}) of sprat and spawning stock biomass (SSB) of Eastern Baltic cod, 1974–2013
Source: ICES 2014



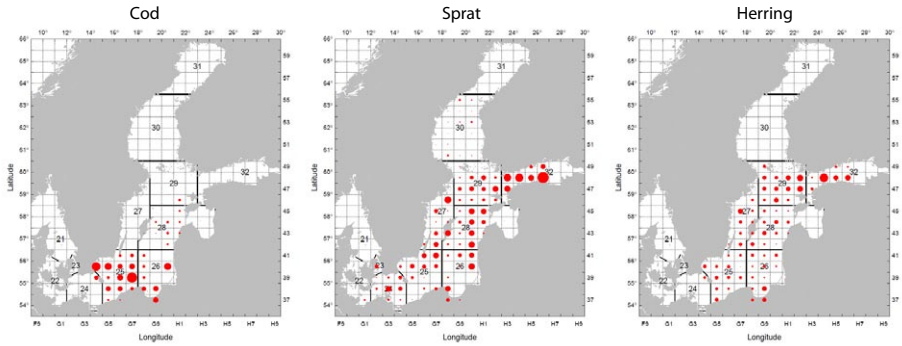


Figure 22. Distribution of Eastern Baltic cod (left), sprat (middle) and herring (right) in the fourth quarter of 2013. Source: Data from ICES' test trawling (BITS) and acoustic surveys (BIAS), ICES 2014

The current stock and catches of sprat depend mainly on the year classes 2009–2012. Of these, 2009 is weak, 2010 is close to the long-term average level and 2011 and 2012 slightly exceed the long-term average level (ICES 2014). As sprat stocks are extremely dependent on recruitment, any assessment of the prospects of stocks is plagued by considerable uncertainties.

For example, the cohorts of 2013 and 2014, whose abundance can only be preliminarily estimated at present, will account for as much as 48% of the estimated spawning stock biomass of sprat in 2015. The actual abundance of these cohorts will not be clear until 2014 and 2015.

As sprat is an important food for cod, the main abundant 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 (Figure 21). Natural mortality prevailed from 1978–1986, when the spawning stock biomass of cod ranged from 250,000 to as much as 300,000 tonnes (ICES 2013). This shows that with current low cod stock levels the key to the management of sprat stock still mainly 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 (Figure 22).

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 2015. This corresponds to a total allowable catch of up to 222,000 tonnes. (For 2014, the ICES advised a catch of up to 247,000 tonnes; not counting the catch of Russia, the TAC_{2014} of EU Member States is 240,000 tonnes.) This TAC should ensure a spawning stock biomass of 877,000 tonnes in 2016.

The STECF agreed with the advice of the ICES concerning sprat, adding that the share of Russia in the total sprat catch should be 10.08% under the agreements made between the EU and Russia. The portion of the EU would thus be 199,622 tonnes in 2015 (Raid and Doerner 2014).

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 low salinity of the Baltic Sea is generally not conducive to the wide distribution of cod. The main spawning grounds of cod are located on the slopes of the Bornholm, Gdansk and Gotland Deeps.

Then again, subject to the availability of favourable salinity, oxygen and temperature conditions, the high fecundity of cod may rapidly increase its abundance. This last occurred in the late 1970s when the spawning stock biomass of cod tripled in less than a decade (ICES 2013). However, a 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. Catches in the period 2010–2012 were slightly over 50,000 and 51,000 tonnes. 2013 saw an abrupt decline in the cod catch – the total quantity landed was just 31,400 tonnes, or 38.5% less than in 2012. Along with discards, the catch of cod in subdivisions 25–32 amounted to 36,375 tonnes in 2013 (ICES 2014). The decline in the catch was particularly sharp in Germany (four times), but also in Denmark and Sweden (around two times). A significant drop could thus be observed in the southern part of the sea, in subdivision 25 (Table 16).

Table 16. Catches of Eastern Baltic cod by country (t), 1992–2013

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**
2013	**6 052**	**249**	**399**	**541**	**2 441**	**1 744**	**11 760**	**2 870**	**5 299**	**0**	**31 355**

Source: ICES 2014

In previous years the ICES' advice for exploitation of Eastern Baltic cod was based on the EU Multi-annual Management Plan for Cod Stocks in the Baltic Sea, according to which the recommended fishing mortality of cod (F_{MGT}) is 0.3. Implementation of the Management Plan requires an analytical assessment of stocks (fishing mortality rate). Unfortunately, the ICES was not able to provide such assessment in 2014. There were several reasons for this, the main one being as follows.

An international bottom trawl survey (BITS) conducted by the ICES indicated that there has been strong recruitment of cod in some places in recent years. However, this recruitment does not end up in commercial fishing catches as adult fish. In addition, the mean body weight and growth rate of cod have shrunk dramatically in the last couple of years. This means that a large proportion of cod no longer reaches the minimum catch length i.e. 38 cm (TL). It remains to be clarified whether there has actually been sharp deceleration in growth or whether the situation can be explained by the effect of incorrect interpretation of age specifications. In April the ICES Baltic Fisheries Assessment Working Group made an attempt to provide an analytical assessment of stocks. The result was substandard and the ICES decided to reject it. In the absence of an analytical assessment of stocks, the ICES gave its advice concerning the total allowable catch (TAC) of Eastern Baltic cod in 2015 on the basis of its approach to Data-Limited Stocks (DLS), i.e. the rules that the ICES applies when no realistic scientific information on a stock unit is available. According to the DLS approach, advice is given on the basis of the change in an index describing the size of biomass. In the case of cod it was decided to use the average CPUE (kg/h) of fish longer than 30 cm in BITS test trawling catches as the index. The relevant time series shows that the average index of 2013 and 2014 was around 20% lower than the average of the previous three years (2010–2012) (ICES 2014). The DLS approach also provides that in this case the advice for exploitation must be reduced by 20% compared to the catch of 2013 (to 29,085 tonnes). Assuming that the proportion of discards will remain at the same level as in recent years, the actual catch of 2015 should be 25,071 tonnes. According to the advice of the ICES, the TAC of 2015 (incl. discards) should not exceed 29,085 tonnes.

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 2013 the TAC of Eastern Baltic cod (EU and Russia) was 68,700 tonnes.

ESTONIA'S TRAWL FLEET IN THE BALTIC SEA

General overview of sector

In 2013, catches were reported for a total of 35 trawlers with a combined main engine power of 10,037 kW and a combined gross tonnage (GT) of 3954. The average age of the vessels was 27 years, and a total of 183 people were employed on them. Compared to 2012, the number of trawlers engaged in fishing decreased by one in 2013 (Figure 23).

In 2013 the Estonian trawl fleet's final sprat and herring quotas (after quota transfers) were 29,809 and 14,932 tonnes, respectively (Figure 24). The sprat catch quota increased by 7% compared to the preceding year; the herring quota remained around the same. While unfavourable weather conditions had prevented the sprat and herring quotas from being used up in 2011, the quota uptake was close to the maximum in the subsequent two years. The catch of cod, on the other hand, fell significantly short of the quota: as opposed to 98% in 2011, the quota uptake levels of 2012 and 2013 were 55.4% and 14.9%, respectively. Scarcity of fish was mentioned as the reason for the modest result of 2013. Since the catch of the trawlers that were the first to start fishing for cod was meagre, the trawlers only remained on the fishing grounds for a short time and then returned to Estonia. Having received this information, other trawlers did not undertake fishing trips, as this would not have been economically reasonable.

In 2013 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 23, 24 and 14 companies respectively. The total catch of Estonian trawlers in the Baltic Sea amounted to 44,944 tonnes in 2013. Based on average first-sale prices, the value of the catch was 9.8 million euros. In terms of species, sprat and herring

Figure 23. Number, combined gross tonnage (GT) and combined power of main engines (kW) of fishing vessels engaged in fishing, 2005–2013
Source: MoA

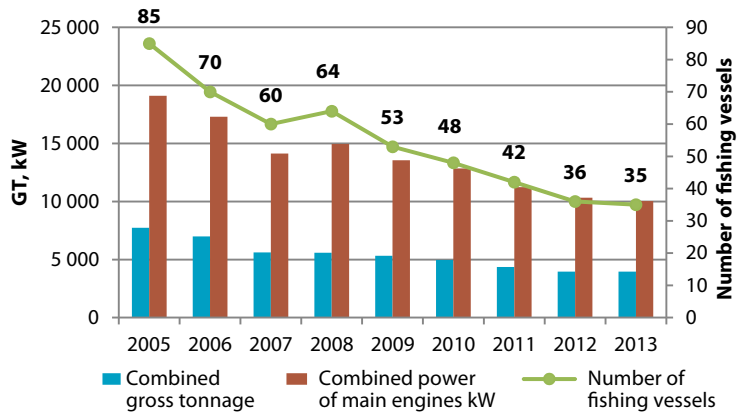
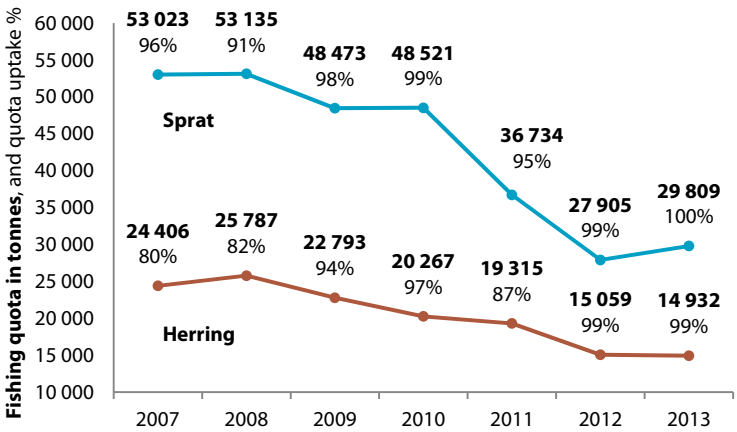


Figure 24. Estonian trawl fleet's final sprat and herring quotas (after quota transfers) and quota uptake (%), 2007–2013
Source: MoA



prevailed in catches, but small amounts of cod, flounder, smelt and eelpout were also caught (Figure 25). The proportion of trawlers in Estonian fishers' commercial fishing in the Baltic Sea amounted to 82% in 2013.

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 in Latvia, Poland and Denmark (Table 17). Compared to 2012, the proportion of fish landed at foreign parts increased slightly, rising from 1.9% to 2.6% of the catch in 2013, with no fish landed at Lithuanian ports. The rise was caused by an increase in the quantities of herring landed at Latvian ports. Estonian trawlers landed fish at 15 Estonian ports (Table 18).

The largest quantities of catch were landed at Dirhami, Veere and Miiduranna, where more than half (59%) of the fish caught by Estonian trawlers was brought ashore. Most of the sprat and herring caught by the Estonian trawl fleet in 2013 were sold on the eastern market (Russia, Ukraine *et al.*) in frozen form. Cod and flounder, on the other hand, were landed and sold at foreign ports (mostly Poland and Latvia).

2013 can be regarded as a relatively good year for the trawling sector. The

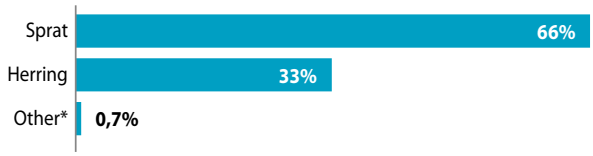


Figure 25. Proportion of fish species caught from Baltic Sea in catches of Estonia's Baltic trawl fleet in 2013
Source: MoA

Table 17. Landings (t) in different countries of fish caught from Baltic Sea by Estonian trawlers in 2012 and 2013

Species	Year	Estonia	Latvia	Poland	Denmark	Lithuania
Sprat	2012	27 697				
	2013	29 770	34			
Herring	2012	14 818	141			
	2013	13 944	909			
Cod	2012		36	424	157	19
	2013	<1	29	167	14	
Smelt	2012	107	1			
	2013	10				
Flounder	2012		6	23	<1	<1
	2013		17	17		
Eelpout	2012	3				
	2013	<1				
Total	**2012**	**42 625**	**184**	**447**	**157**	**20**
	2013	**43 724**	**990**	**184**	**14**	**0**

Source: MoA

Table 18. Landings in Estonian ports of fish caught from Baltic Sea by Estonian trawlers in 2013

County	Place of landing	Landings, t	Proportion (%) of total landings of trawlers
Lääne	Dirhami	11 282.6	25.8
Saare	Veere	7457.6	17.1
Harju	Miiduranna	6875.9	15.7
Saare	Roomassaare	4531.2	10.4
Harju	Meeruse	3474.7	7.9
Hiiu	Lehtma	2211.2	5.1
Saare	Saaremaa	1942.5	4.4
Lääne	Westmeri	1899.4	4.3
Harju	Paldiski Lõunasadam	1655.5	3.8
Saare	Mõntu	785.8	1.8
Harju	Leppneeme	783.1	1.8
Lääne	Virtsu	550.9	1.3
Ida-Viru	Toila	150.4	0.3
Pärnu	Pärnu	88.1	0.2
Lääne-Viru	Kunda	35.5	0.1

Source: MoA

Table 19. Basic indicators related to fishing operations of 12–18 m length class trawlers, 2008–2013

	2008	2009	2010	2011	2012	2013
Number of fishing vessels	23	14	12	10	7	6
Catch, 10^3 t	2	1.5	2.2	1.2	1.1	0.9
Value of catch based on first-sale prices,€10^3	322	207	285	204	208	198
Average number of employees	37	22	20	17	14	13
Average number of trawling hours per vessel	154	163	178	118	162	153

Sources: MoA, UT EMI

Table 20. Basic and economic indicators related to fishing operations of 24–40 m length class trawlers, 2008–2013

	2008	2009	2010	2011	2012	2013
Number of fishing vessels	40	39	36	32	29	29
Catch, 10^3 t	68.9	68	66.1	51.8	42.4	44.0
Value of catch based on first-sale prices, € 10^6	11.9	10.7	9.2	9.9	9.0	9.6
Average number of employees	236	227	207	199	174	170
Average annual wage cost per employee, €	12 057	12 129	12 510	12 368	15 083	14 793
Average number of trawling hours per vessel	1 152	1 025	812	1 080	1174	725
Average fuel price per litre, €	0.503	0.377	0.486	0.709	0.770	0.684
Gross value added, € 10^6	7.3	6.7	5.2	5.2	4.5	5.9

Sources: MoA, UT EMI

year was characterised by an increase in the sprat quota after two years of decline, when the quota decreased by as much as 42%; a slight rise in the first-sale prices of fish (sprat and herring); and a decline in fishery-related operating expenses. To increase sales and profits and alleviate the shortage of raw material, several Estonian fishing companies have acquired subsidiaries in Finland and Lithuania. In Finland the fishing vessels owned by Estonians catch as much as a third of the sprat and herring quota of Finland. Fisheries subsidies paid in 2013 to fishing companies for permanent cessation of fishing activities by scrapping or permanent reassignment of fishing vessels amounted to 1,075,783 euros. In addition, 119,016 euros was paid for investments in fishing vessels. At the end of 2013, Russia's restrictions on imports in Russian Customs Union countries caused concern for companies operating in the fisheries sector.

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 2013, large trawlers prevailed. The preference for large trawlers in fishing can be explained by their efficiency. Greater efficiency enables e.g. higher wages to be paid to the crew.

Basic indicators of 12–18 m length class trawlers

In 2013, six companies were engaged in fishing with small trawlers. Six vessels were used for fishing, i.e. one fewer than the year before (Table 19). These trawlers caught a total of 932 tonnes of fish (sprat, herring and smelt), which represented just 2% of the total catch of the Estonian trawl fleet in the Baltic Sea. The volume of the fish catch decreased by 12% over the year. The first-sale value of the catch decreased due to higher first-sale prices, albeit slightly less (by 5%) than the fish catch, amounting to 198,167 euros. Compared to the preceding year, the proportion of sprat in the total catch of small trawlers grew, accounting for 63% (Figure 26). On average,[2] 13 fishermen were employed on small trawlers in 2013.

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

In 2013, catches were reported for 29 large trawlers owned by 16 companies. These trawlers caught 44,011 tonnes of fish, whose estimated total value amounted to around 9.6 million euros based on average first-sale prices. Similarly to small trawlers, catches were dominated by sprat: sprat and herring accounted for 66% and 33% of the total catch in 2013, respectively. In comparison with the preceding year, the proportion of sprat thus increased a little (64% in 2012, Figure 27).

Although the number of large trawlers engaged in fishing remained the same as in 2012, the average number of employees decreased by 2%, from 174 in

[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

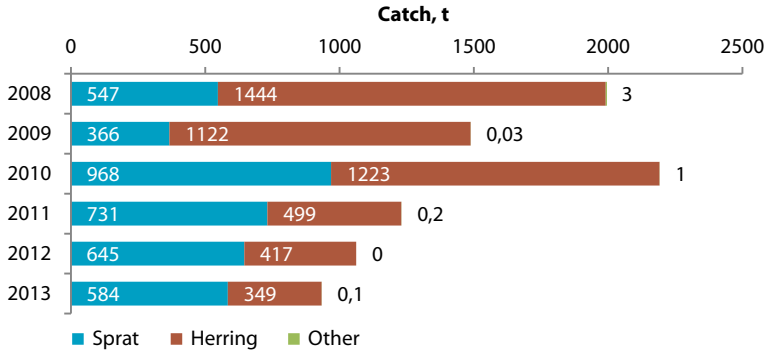


Figure 26. Sprat and herring catches (t) of 12–18 m length class trawlers, 2008–2013
Source: MoA

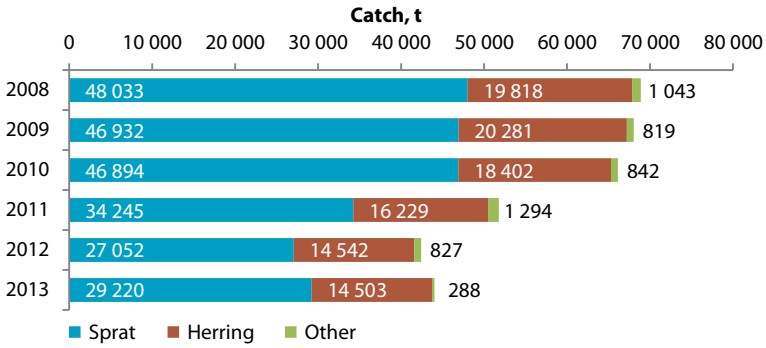


Figure 27. Catches of sprat, herring and other species (t) of 24–40 m length class trawlers, 2008–2013
Source: MoA

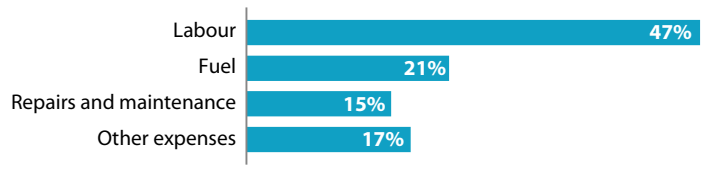


Figure 28. Distribution of operating expenses related to fishing operations of fishing vessels of 24–40 m length class in 2013
Source: UT EMI

2012 to 170 in 2013 (Table 20). While the total catch of large trawlers grew due to the increase in the sprat quota, the average number of trawling hours per vessel declined, because opportunities to fish for cod were used to a much lesser extent than in previous years. The average annual wage cost per employee was 14,793 euros in 2013, or 2% less than in 2012. The gross value added of the segment of large trawlers amounted to around 5.9 million euros. The fishing-related operating expenses of trawlers in the 24–40 m length class amounted to 7.1 million euros in 2013. Labour (47%) and fuel (21%) made up the largest proportion of the expenses (Figure 28). Compared to 2012, fishing-related operating expenses decreased by 11% in 2013. This was mainly due to lower fuel costs. The decline in fuel costs, in turn, resulted from the decline in the average price per litre of fuel and in the number of trawling hours.

Inland fisheries

LAKE VÕRTSJÄRV FISHERY

Commercial fishing catches from Lake Võrtsjärv totalled 263 tonnes in 2013. Gibel carp, which had occurred in the lake in large numbers, played a major role in the increase in the total catch compared to 2012 (209 tonnes). The catch of small-sized Gibel carp amounted to nearly 40 tonnes (Table 21), accounting for an unusually large share of the total catch (15%). By volume, the biggest catches were produced by bream (79.3 tonnes), pike (70.1 tonnes) and pikeperch (40.5 tonnes), which accounted for 30%, 27% and 15.4% of the total catch, respectively (Figure 29). Trap nets were the main fishing gear and provided 83% of the total catch. Forty-five tonnes or 17% of the total catch were taken with gill nets. Pikeperch accounted for 60% and pike represented 26% of gill net catches. The proportion of other fish species was just 14%.

The number of fishing gear and the fishing effort have remained unchanged on Lake Võrtsjärv in recent years. In 2013, permits were issued for fishing with 324 trap nets and 320 gill nets, plus 40 recreational gill net permits. Permitted commercial fishing was distributed between 52 permit holders in 2013. This number is unprecedented: there have never been over 50 commercial fishing permit holders on Lake Võrtsjärv.

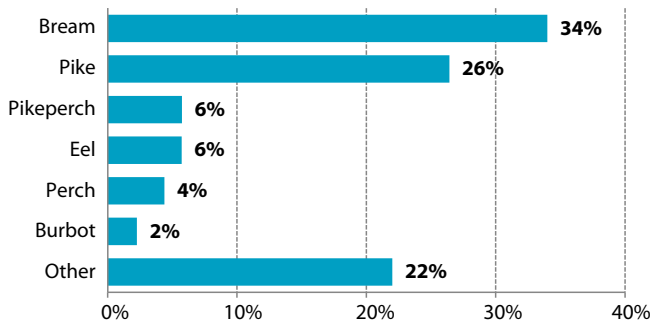


Figure 29. Proportion (%) of fish species in trap net catches from Lake Võrtsjärv in 2013
Source: EULS, MoA

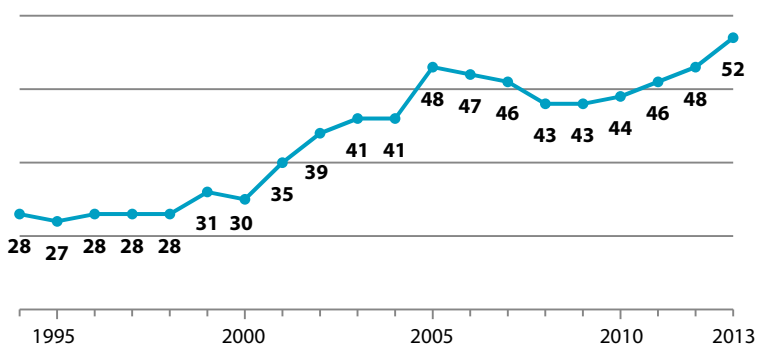


Figure 30. Number of commercial fishing permits issued for Lake Võrtsjärv, 1994–2013
Source: Fisheries Information System of the MoA, EULS

The number of permit holders increased in connection with the sale of a part of fishing rights (Figure 30). Commercial fishing rights were most needed for tourism operators to be able to apply for support under the regional measure from the Fisheries Fund.

Eel. The eel catch of 2013 (12.5 tonnes) remained virtually unchanged compared to the preceding year and accounted for just over a third of the long-term

Table 21. Catches (t) from Lake Võrtsjärv, 1971–2013

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**
2013	**12.7**	**40.5**	**70.1**	**79.3**	**5.2**	**9.7**	**47.8**		**264.9**

* '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.

average (32 tonnes). Recreational fishing with longlines produced another 190 kg of eel.

Eel catches are significantly impacted by weather – when it is possible to start fishing in the spring, how long is the fishing period in the autumn, and how high is the water level. In 2013 the spring water level was close to the average after several years. Unfortunately, the period of successful eel fishing was shorter than usual, because the ice cover did not break up until late April and it was only possible to start fishing with trap nets in May. The catch taken in May was higher than the average for the past few years, however. Also in August and September, even though the water level was lower than the average, the catch was pretty decent against the backdrop of recent unsatisfactory years. Indeed, the biggest catches of eel are usually taken in May and September, as was the case in 2013. The total quantity landed was still well below the projected catch.

The main reason for the decrease in the catch 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 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 slightly decline in the coming years (Figure 31). Given that the abundance of glass eels reaching the coast of Europe has started to grow in recent years, their market price will hopefully decline and the restocking volume will increase in the years to come.

Lake Võrtsjärv is restocked with both pre-grown eels and glass eels since 2011. As the price of the restocking material has remained at the same level for several years (in the case of glass eels, around 500 €/kg), the restocking volume has also been constant: on average 550,000–770,000 elvers and 80,000–120,000 pre-grown eels are introduced into the lake each year. In 2013, 760,000 glass eels and 108,000 pre-grown eels were released into Lake Võrtsjärv. The introduction of glass eels is paid for using fishing right fees and support from the Environmental Investment Centre. Pre-grown eels are introduced in the lake with the support of the European Fisheries Fund.

Despite the recession in eel catches, fishermen's incomes have grown thanks to a steady rise of eel first-sale prices in recent years (5.72 €/kg in 2010, 6.56 €/kg in 2011, 7.35 €/kg in 2012, and 8.36 €/kg in 2013).

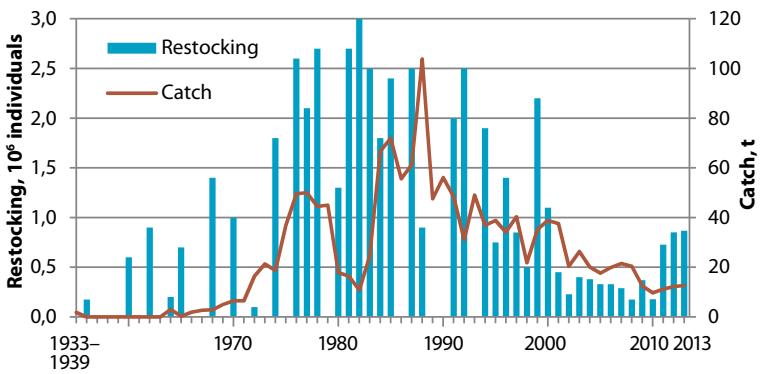


Figure 31. Eel restocking and catches in Lake Võrtsjärv, 1933–2013
Source: EULS

In home yard sales the price of fresh eel is nearly twice the official first-sale price. Fishermen are increasingly adding value to their catches locally, selling smoked or pickled eels in tins or glass jars. Thus the price of raw fish almost doubles in home yard sales.

Pikeperch. Pikeperch stock and catches have been strong in Lake Võrtsjärv for years. In 2013 commercial fishermen caught 39.2 tonnes of pikeperch from Lake Võrtsjärv, which is approximately the same quantity as the year before and a good result compared to the average of several years. In winter and early spring, when the lake was exceptionally covered with ice until mid-April, 11 tonnes of pikeperch was caught with nets under the ice, incl. 7 tonnes in January. The largest pikeperch catches are usually taken with gill nets: such catches accounted for 77% and 68% in 2012 and 2013, respectively. Fishing is usually the most successful at the end of the year after the creation of a permanent ice cover. However, the autumn of 2013 was unusually warm, and there was no permanent ice cover even in December. This is why the pikeperch catch taken in late autumn was smaller than usual. For example, while 8.4 tonnes of pikeperch was caught in December 2012, the catch of December 2013 was just 1795 kg. Recreational fishermen caught 1170 kg of pikeperch on the basis of fishing cards during the year; thus the total catch of pikeperch taken from Lake Võrtsjärv by commercial and recreational fishermen amounted to more than 40 tonnes again.

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 of pikeperch, measured from the tip of the snout to the end of the caudal fin (TL), is 51 cm in Lake Võrtsjärv, 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 subsequent year class.

Pike. Catches of pike were at their peak in the mid-2000s: the year 2006 was marked by the biggest ever catch of 79.5 tonnes (Table 21). Thereafter catches declined significantly, amounting to around 30 tonnes i.e. the long-term average (32.2 tonnes) for several consecutive years. From 2012 onwards, pike catches have increased considerably (46.6 tonnes). The commercial fishing catch of pike taken from Lake Võrtsjärv amounted to as much as 70 tonnes.

Trap nets are the main fishing gear in pike fishing. In 2013, 83% of pike was caught using trap nets, with the share of gill nets being just 17%. Trap net fishing was the most successful from September to October, when nearly 30 tonnes of pike was caught. Around 700 kg of pike was caught with gill nets on the basis of fishing cards.

Bream. Bream continues to produce the biggest catches in Lake Võrtsjärv. The catch of bream increased dramatically in 2008, when a total of 158 tonnes of large bream (TL over 36 cm) was caught. The period 2009–2010 was characterised by a significant decline, with 80 tonnes of bream caught in 2009 and only 56 tonnes in 2010.

The catch figures of the last three years do not represent actual statistics that could be compared with the figures from previous years. This is because some fishermen have recorded second-rate fish as by-catch of trap fishing in their logbooks, with small bream accounting for 70–80% of such second-rate fish. How-

Table 22. Species composition, abundance and weight (number of individuals and kg per trawling hour) of trawling catches from Lake Võrtsjärv in 2013

2013	WPUE (g/h)		NPUE (ind./h)		Average weight
Species	TW g	%	No. of ind..	%	of fish, g
Lake Peipsi (dwarf) smelt	376	0.1	63	0.3	6.0
Pike	20 699	4.3	15.0	0.1	1380
Rudd	166	0.03	10.0	0.04	17
Roach	67 420	13.9	6937	30.9	9.7
Bleak	14 802	3.0	1910	8.5	7.7
Bream	255 884	52.6	4739	21.1	54
Silver bream	32 234	6.6	1865	8.3	17
Gibel carp	2784	0.6	29	0.1	96
Gudgeon	365	0.1	34	0.2	11
Burbot	1742	0.4	1.2	0.0	1452
Perch	5877	1.2	459	2.0	12.8
Pikeperch	32 031	6.6	156	0.7	205
Ruff	51 823	10.7	6219	27.7	8.3
Total	**486 203**	**100**	**22 437**	**100**	**22**

Source: EULS

Table 23. General assessment of state of stocks and fishing mortality in Lake Võrtsjärv in 2013 and the near future, by key species

Species	State of stocks[1]			Fishing mortality[2]
	2013	until 2014	until 2017	
Eel	3	3	2	A
Pikeperch	1	1	2	B
Pike	1	1	2	B
Bream	2	2	3	A
Perch	3	3	3	B
Burbot	2	2	2	A
Lake Peipsi (dwarf) smelt	3	2	–	D

[1] State of stocks – 1: good; 2: moderate; 3: poor; 4: depleted
[2] Fishing mortality – A: low; B: moderate; 3: high; D: insufficient data

Source: EULS

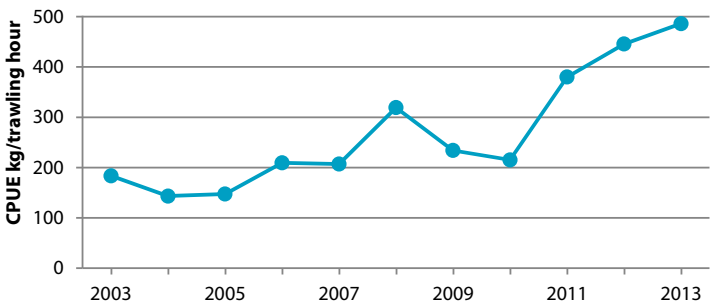


Figure 32. Trawling catch kg/trawling hour in Lake Võrtsjärv, 2003–2013
Source: EULS

ever, some fishermen do not record second-rate fish or discard it; sometimes all the second-rate fish is recorded as bream. In winter fishing, the proportion of bream is very modest, totalling up to two tonnes. According to official statistics, 79.3 tonnes of bream was caught from Lake Võrtsjärv in 2013.

In a longer-term comparison, the abundance of large bream is currently high in Lake Võrtsjärv, the stock is in good state and the size and mean weight of fish is above the average.

A strange change took place in the fish fauna of Lake Võrtsjärv in 2013. Namely, a lot of small Gibel carp occurred in the lake in early May (the mean weight of the fish was 76 grams in May). The catch of this rough fish of little value totalled approximately 40 tonnes over the year. Some of the catch was not recorded because there was so much of Gibel carp in May, especially in the trap nets of the southern part of the lake, that fishermen could not pull the fish bag into the boat and had to release all the fish, including valuable species, back into the lake. This caused resentment among fishermen, as shoals of Gibel carp moved across the lake during the fishing season and got caught in trap nets in large numbers in different regions of the lake. The highest catch was up to several hundred kilograms per pot.

The increase in the total biomass of fish in Lake Võrtsjärv in recent years (Figure 32) has resulted from the rapid growth of the abundance of second-rate fish of little value (small bream, roach, ruff, bleak). This is a consequence of discarding second-rate fish for several consecutive years. The mean weight of bream is very low: 54 grams (Table 22). As there is no market for fish unsuitable for human consumption, fishermen are not interested in bringing it ashore. The sharp rise in the proportion of second-rate fish of little value threatens the health of Lake Võrtsjärv, resulting in a deterioration of the quality of water and impairing food competition, especially among benthivorous fish (eel, bream, ruff, silver bream, etc.).

The prospects of catches from Lake Võrtsjärv for the next few years continue to be good or even very good for most key species (Table 23).

LAKE PEIPSI FISHERIES

State of fish stocks

In 2013 the fish stocks of Lakes Peipsi and Lämmijärv and thus also the catch quotas were at the usual levels of recent years. Estonian fishermen may have caught a total of around 3000 tonnes of fish in 2013. Of this quantity, the quota of perch amounted to 1000 tonnes and the quotas of pikeperch and bream amounted to 650 tonnes (Table 24). Pike and vendace quotas were significantly higher in 2013 than in previous years, but the quotas of ruff and other species were lower. The latter were reduced due to lack of interest in fishing, rather than due to a shortage of stocks. The cohort of 2009 continued to account for the bulk of both pikeperch and perch stocks (Tables 25 and 26). According to the most recent data, there is a significant recruitment of pikeperch in the form of the cohort of 2012. This is not the case with perch. Generally, the state of the pikeperch stock can be regarded as moderate, the state of the perch stock is currently still between good and moderate, and the pike, bream and roach stocks of the lake are in a good state. The vendace stock of the lake has recovered to a level that allows commercial fishing.

Table 24. Estonian national fishing quotas (t) on Lakes Peipsi and Lämmijärv, 2009–2013 (quota transfers and deductions on account of overfishing taken into account)

Species	2009	2010	2011	2012	2013	Average
Pikeperch	600	546	672	714	650	636
Perch	850	1200	900	1400	1000	1070
Pike	85	70	110	160	165	118
Bream	570	460	600	614	650	579
Roach	330	330	305	300	280	309
Burbot	50	50	50	50	50	50
Ruff	300	300	300	300	150	270
Smelt*	5	5	5	5	5	5
Whitefish	7	7	5	3	2	5
Vendace*	1	1	10	15	15	8
Other	50	50	50	50	25	45
Total	**2848**	**3019**	**3007**	**3611**	**2992**	**3095**

* For smelt, all years; for vendace in 2009 and 2010, only test fishing.
Source: UT EMI

Table 25. Size and total allowable catch of pikeperch stock in Lakes Peipsi and Lämmijärv, 2012 and 2013

	Size of stock, 2012			Total allowable catch, 2013		
Year class	Age	No. of ind. (10^3)	Total weight (t)	Age	No. of ind. (10^3)	Total weight (t)
2011	1+	1965	177	2., 2+	187	41
2010	2+	201	39	3., 3+	36	16
2009	3+	5560	3336	4., 4+	1008	1088
2008 and earlier	4+ and older	201	402	5. and older	66	146
Total		**7927**	**3954**		**1297**	**1291***

* The quantity of 1300 t was agreed on, with Estonia's share accounting for a half, i.e. 650 t.

Table 26. Size and total allowable catch of perch stock in Lakes Peipsi and Lämmijärv, 2012 and 2013

	Size of stock, 2012			Total allowable catch, 2013		
Year class	Age	No. of ind. (10^3)	Total weight (t)	Age	No. of ind. (10^3)	Total weight (t)
2009	3+	78 962	4 738	4., 4+	21 048	1 684
2008 and older	4+ and older	3 287	822	5., 5+ and older	1 084	325
Total		**82 249**	**5 560**		**22 132**	**2 009***

* The quantity of 2000 t was agreed on, with Estonia's share accounting for a half, i.e. 1,000 t

Fisheries management

There were no major changes in the fisheries management of the lake in 2013. The key components of the fisheries management were as follows:

- the minimum size of pikeperch was 40/46 cm (SL/TL) until the end of August, and 30/35 cm from September (but only in Danish seine and trap net fishing);
- large-mesh gill nets were permitted for fishing from the beginning of the year until 20 April (minimum mesh size 65/130 mm), and from 1 September until the end of the year (minimum mesh size 55/110 mm);

Table 27. Number of companies and fishermen related to Lake Peipsi, 2006–2013

	2006	2007	2008	2009	2010	2011	2012	2013
Companies	96	94	87	68	69	70	68	66
Total number of fishermen	530	490	300	336	365	405	383	367

Source: MoA

Table 28. Estonian catches (t) from Lakes Peipsi and Lämmijärv from 2009–2013 and the average catch of these years

Species	2009	2010	2011	2012	2013	Average
Pikeperch	654	508	672	646	637	623
Perch	808	1205	757	1061	914	949
Pike	66	46	100	153	143	102
Bream	537	435	578	577	604	546
Roach	189	198	225	207	185	201
Smelt	0	0	0	0	0	0
Whitefish	3	1	0	0	0	1
Vendace	1	0	1	3	10	3
Burbot	27	26	30	21	23	25
Other	76	41	9	3	5	27
Total	**2 360**	**2 461**	**2 371**	**2671**	**2 520**	**2 476**

Source: MoA

- small-mesh nets (mesh size 30/60 to 40/80 mm) were permitted for fishing in the coastal zone of the lake from 1 March to 5 May (due to the late spring the end date of the fishing period was postponed by 10 days);
- vendace could be fished only in July with ordinary trap nets and three pound nets (but these permits were not issued);
- fishing with Danish seines was allowed with ordinary cod ends (minimum mesh size 24/48 mm in the bag) only in the autumn period from 1 September to 20 October, but on no more than 800 fishing days;
- fishing with trap nets was virtually unrestricted, except for the general cessation of fishing after the exhaustion of quotas.

The permitted fishing capacity was the same as in previous years, including as regards Danish seines (up to 20 seines) and large-mesh gill nets (up to 3000 nets with a length of 70 m), the use of which has been agreed in the Estonian-Russian Fisheries Commission.

There were 66 companies with 367 fishermen operating on the lake under these conditions on the lake in 2013 (Table 27).

Catch and its value

The catch of 2013 was at the average level of recent years (Table 28). Changes are primarily due to stocks (pike and vendace) or interest in fishing (ruff and other species). As usual, the highest catches were taken in September, when around 1000 tonnes of fish was landed (Figure 33). All the key types of fishing gear were used on the lake then. The biggest quantities were caught using large-mesh gill nets, but the total annual catch taken with trap nets and lines of trap nets was much higher (Figure 34).

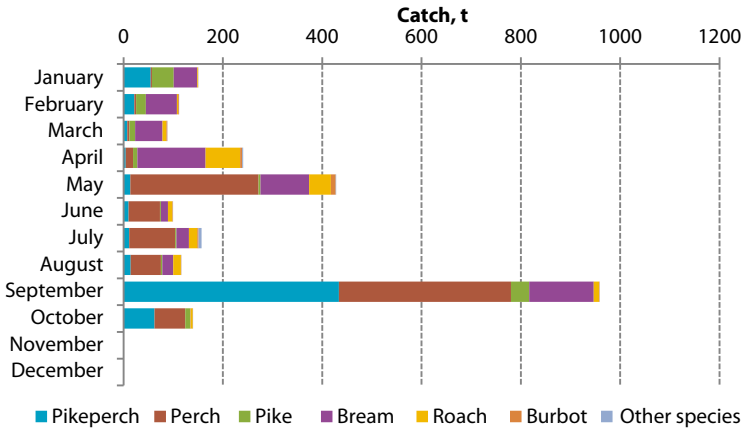


Figure 33. Dynamics of catches from Lakes Peipsi and Lämmijärv by species in 2013
Source: UT EMI

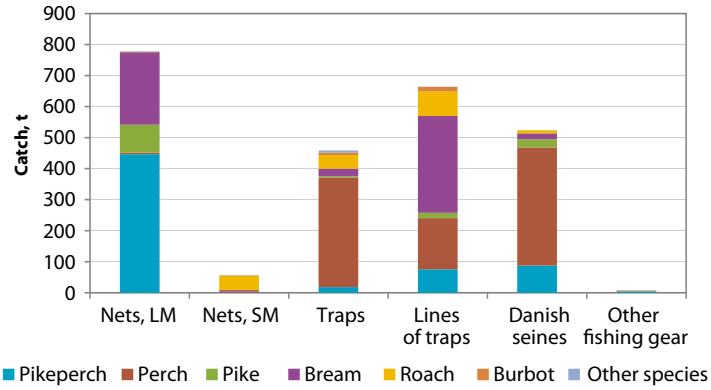


Figure 34. Estonian catches (t) from Lakes Peipsi and Lämmijärv in 2013 (without research fishing)
LM – large-mesh
SM – small-mesh
Source: UT EMI

While in 2012 the value of the catch taken from the lake totalled around 5.3 million euros, in 2013 it dropped by 1 million to 4.3 million euros. The drop was related to the decline in the average first-sale prices of the most valuable fish species – pikeperch and perch. The first-sale price of pikeperch fell from 3.74 to 3.15 euros per kg, and the first-sale price of perch decreased from 2.07 to 1.82 euros per kg. However, these species still generated the bulk of the catch value, with the proportion of pikeperch being 46% and that of perch being 39%. Among fishing gear, large-mesh gill nets produced the biggest revenue (39% of the total catch value), followed by trap nets and lines of trap nets (36% of the catch value), and thirdly by Danish seines (24% of the catch value).

As has been the case in recent years, quotas were exhausted in early autumn already, because the fishing capacity was high and fishing efforts exceeded it sometimes (in the case of large-mesh nets). In 2013, first the quota of bream and then that of pikeperch was used up by more than 90%, which is why fishing had to be stopped altogether from 10 October. On the whole, the quotas of 2013 were used up to the extent of 84%. The quotas of the four key species (pikeperch, perch, bream and pike) were used up to the extent of 87–98% (Table 29). Fish caught from the lake was landed in nearly 50 places. The biggest quantities were landed in Kallaste (total 309 tonnes in two ports), followed by Lohusuu (300 tonnes), Mehikoorma (total 284 tonnes in two ports), Omedu (total 265 tonnes

Table 29. Estonian catches (t), quotas (t), uptake (%) and balances (t) of quotas for Lakes Peipsi and Lämmijärv in 2013

Species	Catch	Quota	Uptake	Balance
Pikeperch	637	650	98	13
Perch	914	1000	91	87
Pike	143	165	87	22
Bream	604	650	93	47
Roach	185	280	66	95
Whitefish	0	2	17	2
Smelt	0	5	0	5
Vendace	10	15	64	5
Burbot	23	50	46	27
Ruff	2	150	1	148
Other	3	25	12	22
Total	**2520**	**2992**	**84**	**472**

Source: MoA

in two ports) and Varnja (209 tonnes). Approximately 50–150 tonnes of fish is landed annually in another dozen lakeside villages. The quantity of fish landed in the remaining small ports is less than 50 tonnes per year.

One specific feature of Lake Peipsi fisheries management has been the reduction of the standard minimum size of pikeperch in accordance with the general condition of the stock and the strength of future cohorts to be fished. This approach has served the purpose of reducing discards and thus hidden fishing mortality in autumn fishing. Changes to the standard minimum size of pikeperch have primarily been applied in the widespread use of Danish seines, but concessions have also been made in trap net fishing, and the least in gill net fishing. Catches of pikeperch smaller than the standard minimum size have always been deducted from the quota.

Fishing with Danish seines is currently considerably more restricted than in the past. There have been times when fishing with Danish seines was allowed from August to May. Now, however, this fishing gear may be used only in autumn and on a limited number of days. Unlike other fishing methods, seine fishing is subject to strong supervision, which comprises vessel monitoring systems and the requirement to give advance notification of catches. Neither Estonia nor Russia has made full use of the agreed fishing period in recent years (Figure 35). Fishing with Danish seines has essentially been limited to around a month on both sides, given that, on average, 31 trips to the lake are undertaken per seine in Estonia and 37 in Russia. Perch has always been the main target species in this fishing gear, with the proportion of pikeperch being limited to 8–27% and on average to 20% (Figure 36). To ensure that small pikeperch occurring in catches are not discarded and left to die in vain, the standard minimum size of pikeperch is reduced for the period of seine fishing (though not every year, Figure 35). In addition to Danish seines, small pikeperch may be fished in autumn using trap nets (based on the equal right to catch). Official catches and analyses thereof allow for the conclusion that, on average, catches of pikeperch smaller than the traditional minimum size do not represent more than 20% of the total annual pikeperch catch i.e. 125 tonnes, at least on the Estonian side.

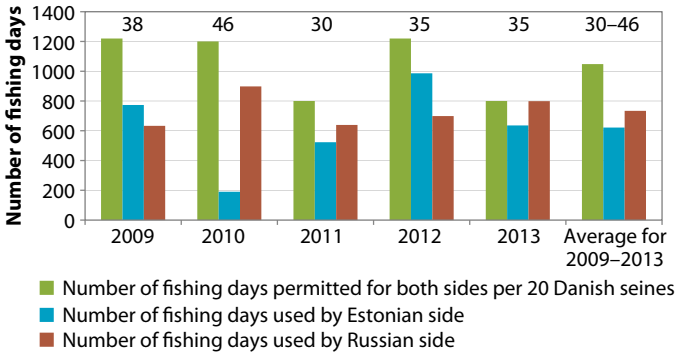


Figure 35. Permitted and used Danish seine fishing days on Lake Peipsi from Estonian and Russian sides, 2009–2013 (the numbers above columns indicate the standard minimum size of pikeperch (TL, cm) set for the fishing period)

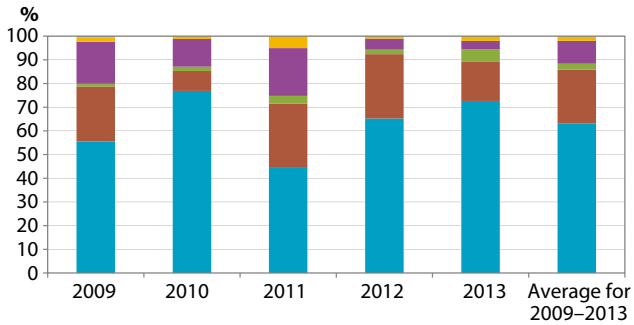


Figure 36. Species composition (%) of Danish seine catches from Lake Peipsi on Estonian side, 2009–2013

Table 30. Pikeperch catches from Lakes Peipsi and Lämmijärv, distribution of catches between different fishing gear (t), and average catches (t and %), 2009–2013

Fishing gear/ fishing period	2009	2010	2011	2012	2013	Average	%
Gillnets, LM[1]	358	402	478	246	446	386	62
Gillnets, SM[2]	1	1	0	0	0	0	0
Traps	34	22	28	24	18	25	4
Lines of traps	111	59	84	78	76	81	13
Danish seines	146	19	77	287	87	123	20
Other fishing gear	4	3	1	8	4	4	1
Total	**653**	**506**	**669**	**643**	**632**	**621**	**100**

[1] LM – large-mesh nets with a minimum mesh size of 55/110 or 65/130 mm, depending on the year or the fishing season
[2] SM – small-mesh nets with a mesh size of 30/60 to 40/80 mm
Source: UT EMI

Table 31. Proportion (%) of net catches in landings of pikeperch in different years and half-years

Fishing period	H1	H2	Total
2009	55	55	55
2010	88	69	80
2011	91	47	72
2012	87	25	38
2013	77	69	71
Average	**80**	**53**	**62**

Source: UT EMI

As in other pikeperch lakes, nowadays a large part of the catch is taken from Lake Peipsi using passive fishing gear, specifically large-mesh gill nets, which are particularly prevalent in under-ice fishing during the first half of the year (Tables 30, 31). The minimum allowed mesh size of large-mesh gill nets is usually 65/130 mm, and in some years temporarily also 55/110 mm.

Catches of such fishing gear are dominated by more than 40/46 cm long fish aged four years and more (Figure 37, Table 32, 33). Large pikeperch (longer than 40/46 cm) caught in gill nets has been the prevalent reason for restricting fishing on the lake in some years. For example, large pikeperch catches in January 2011

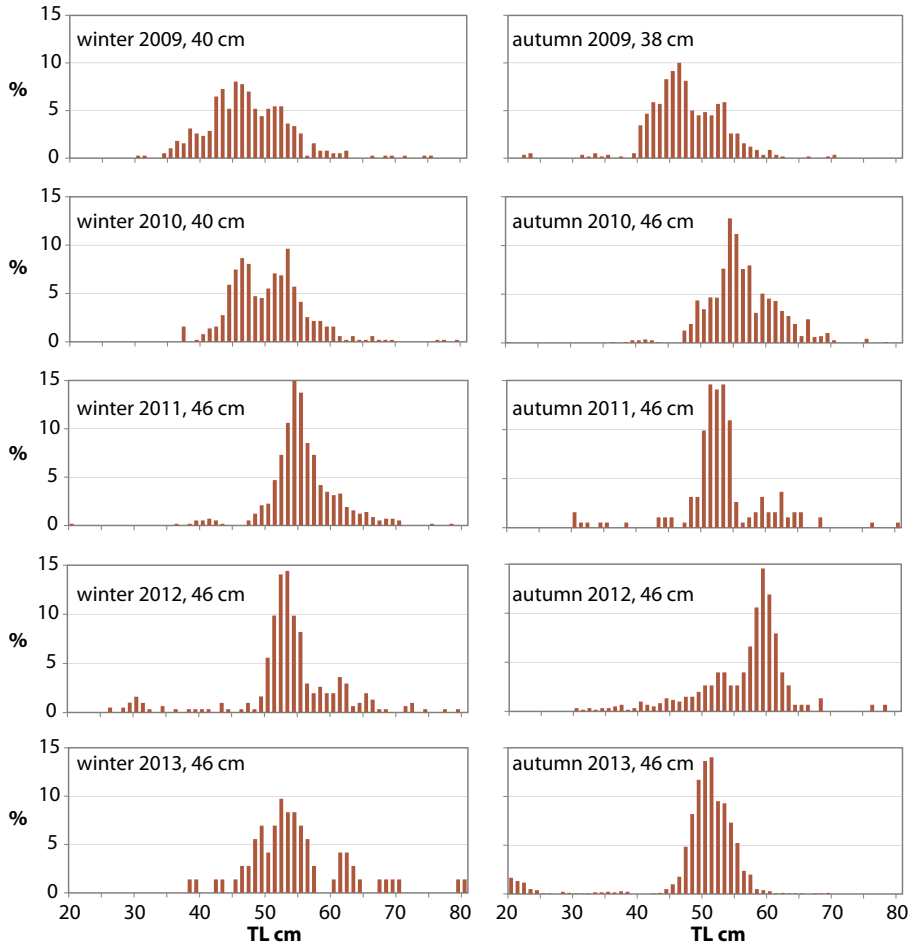


Figure 37. Length composition (%) of pikeperch catches taken with gill nets and applicable standard minimum sizes, 2009–2013 Source: UT EMI

entailed restrictions on fishing using gill nets in the first half of the year already. In September 2013, large pikeperch catches led to total closure of fishery from early October (Figure 38).

In light of the foregoing, the statement in the scientific article by A. Kangur, P. Kangur, K. Kangur and K. Ginter titled "Shifts in the population structure of pikeperch, Sander lucioperca (L.), and its implications to the food web interactions in Lake Peipsi", according to which "the specimens larger than legal size are almost completely removed", is incomprehensible and incorrect. Data and results of studies concerning fisheries management and catches are publicly available in Estonia, and the relationship between the size of target species and the mesh size is a fact that has been common knowledge for at least half a century. The authors did not take these considerations into account in their work. Unfortunately, the false claims set out in the article have served as the basis for fish consumption recommendations of the Finnish representatives of the World Wide Fund for Nature, and these recommendations impair the opportunities to export Lake Peipsi pikeperch, as well as Estonian pikeperch in general.

Table 32. Age composition (%) of pikeperch catches taken with gill nets in winter 2009–2013

Age	2009	2010	2011	2012	2013
<4	0	0	3	9	0
4	87	0	6	57	14
5	11	95	0	21	64
>5	2	5	91	13	22
Total	100	100	100	100	100

Table 33. Age composition (%) of pikeperch catches taken with gill nets in autumn 2009–2013

Age	2009	2010	2011	2012	2013
<4+	3	9	81	31	9
4+	93	0	14	66	80
5+	4	85	4	3	10
>5+	1	6	1	1	1
Total	100	100	100	100	100

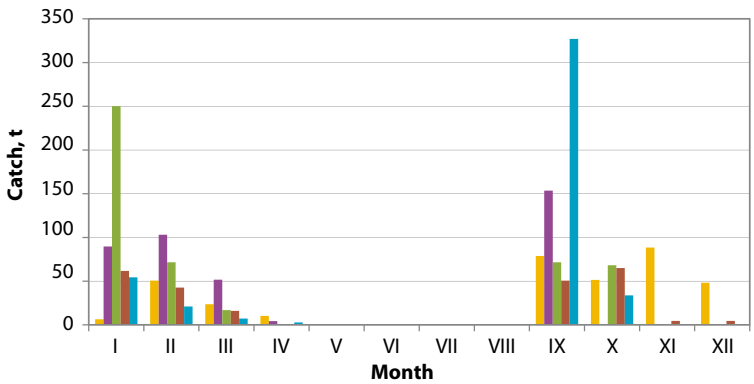


Figure 38. Dynamics of gillnet catches of pikeperch on Estonian side, 2009–2013

In view of the growth rate of Lake Peipsi pikeperch stock and its potential natural mortality, fishing for pikeperch should not be started until the fish are three or four years old. Theoretically, pikeperch catches from the lake would be larger and more lucrative in this case. In practice, however, this model would hardly be workable. With the current approximately 10,000 tonnes of biomass of predatory fish, the lake (dwarf) smelt stock of the lake has decreased drastically and has not been able to recover, which means that the fry of the main predatory fish – pikeperch and perch – have to feed mainly on plankton for year and a half or even two years.

Poor feeding conditions lead to slow growth and high natural mortality during the first years of life, and ultimately to less abundant cohorts available for commercial fishing compared to previous years, when the abundance of lake (dwarf) smelt was high.

Another specific feature of Lake Peipsi fisheries management is the double regulation of fishing capacity (and thereby catches). While in the great lakes of Europe as well as in Lake Võrtsjärv and coastal waters of Estonia the quantities of fish caught are regulated only through the input (the maximum number of fishing gear, the fishing period, the mesh size of nets, etc.), in Lake Peipsi the quantity of fish caught is also restricted through the output, i.e. the uptake of fishing quotas. This mechanism ensures that fish stocks and catches remain as stable as possible within the limits set by natural conditions, and allows the fish stocks of the lake that belongs to two countries to be used on an equal footing. Quotas are determined on the basis of the size and composition of fish stocks. In the case of pikeperch, for example, the recommended fishing mortality has never exceeded 0.3. This figure represents a sustainable level for pikeperch.

Recreational fishing

The management of fish stocks as an important natural resource falls in the areas of government of two ministries since 2006. In terms of issuance of permits, responsibilities are divided as follows: permits for commercial fishing are issued by the Ministry of Agriculture and permits for recreational fishing are issued by the Ministry of the Environment. The responsibilities of an issuer of permits include the collection of catch data.

Recreational fishing is based on fishing rights and is divided into three categories depending on the fishing ground and the fishing gear used:

1) fishing with one simple hand line,
2) fishing with up to three hook gears – spinning reel, trolling line, pulling device, fly hook, bottom line, unanchored trimmer, simple hand line, harpoon gun and hook;
3) fishing on the basis of fishing cards, using a gill net, longline (consisting of up to 100 hooks), hoopnet, dragnet, crayfish dip-net or trap. Fishing on the basis of a fishing card is also permitted in Endla and Silma Nature Reserves and Matsalu National Park, as well as on a number of salmon and trout rivers.

Fishing with one simple hand line is free for everyone, but the other two fishing rights are given for a fee. There are, however, certain categories of people who do not have to pay for fishing with hook gears, but to whom a fishing card is issued for a fee. According to the Fishing Act, these categories include pre-school children, students under 16 years of age, pensioners, unlawfully repressed persons and disabled persons.

Recreational Fishing Information System

Records of fishing rights obtained for the purpose of recreational fishing are kept in the web-based Recreational Fishing Information System managed by the Ministry of the Environment. Agencies have been using that information system from 2004 (it was initially called Fisheries Information System). In its early years, the system was used primarily for issuing commercial fishing permits and collecting catch data. After the administration of fisheries was divided between two ministries in 2006, the information system underwent a number of development cycles and remained in the use of the agencies that handle recreational fishing permits. The Recreational Fishing Information System (RFIS) currently contains data on all fishing rights sold (fishing with up to three hook gears or on the basis of fishing cards). No records are kept of free fishing rights (simple hand line, persons who enjoy free fishing rights), because no separate documents are issued with regard to these rights.

It was in 2008, when the option of mobile payment was introduced, that a part of fees for recreational fishing rights were first entered in the RFIS. However, no data of fees paid via banks, an option that was also in effect at that time, were entered in the system. That situation lasted until January 2011, when payments via banks were fully replaced by an electronic payment option (on the pilet.ee

website). As the bank accounts were not closed (only the reference number was closed), some fishermen continued to transfer their fees via banks, which meant that, in the eyes of the law, they were fishing without a permit. In 2013 the number of such transfers was around 1000, with a fairly substantial share of the transfers having been made by our southern neighbours – Latvians. This behaviour is probably due to ignorance, rather than an established habit.

Data on the issuance of fishing cards in the RFIS date back to 2004. Unfortunately, the data of the first year of using the system are incomplete, because all the permits that had been issued were not entered in the database. This was due to an amendment of the Fishing Act which entered into force on 16 January 2004 and which created the legal basis for issuing fishing cards based on a new concept. Prior to that, restricted fishing permits and extra sheets of fishing cards were used. It should be noted that before 2004 a fishing card used to be a document certifying the right of recreational fishing (fishing with up to three hook gears). Since most of the permits for 2004 had been issued at the end of 2003 in the form of restricted fishing permits, they were not recorded in the RFIS as fishing cards.

Fishing with up to three hook gears

According to the data contained in the RFIS, recreational fishing rights were paid for in 90,214 instances in 2013. This does not mean, however, that all these permits were used only in 2013. An annual permit is valid for 365 days and unless it is bought at 00:00 on 1 January its validity will fall in two years.

The number of permits obtained does not equal the number of fishermen: many fishermen bought a fishing right during the year on more than one occasion. Permits valid for one day were bought the most often in 2013 (Figure 39). This option was used primarily by those whose went fishing just a couple of times during the year. Surprisingly, there were many of those who had bought so many daily permits that the aggregate price of these permits exceeded that of an annual permit. For example, one person bought a permit on 65 occasions, paying a total of 72.22 euros, while an annual permit would have cost just 20 euros.

If all repeated purchases are excluded, a recreational fishing right was bought by 49,125 fishermen in 2013 (Table 35). This number translates to 1.8 purchases of a recreational fishing right per person. The number of foreigners who bought a permit was 7301 (around 15%).

Fishing card

Unlike a recreational fishing right, a fishing card is valid until the end of the current calendar year, regardless of what month it is purchased in (except December, when a fishing card can be bought for the next year). In the case of fishing cards it is therefore possible to observe the number of cards issued for a particular year and the number of persons to whom they were issued. According to the data contained in the RFIS, a total of 15,900 fishing cards were issued for (not in) 2013.

If all repeated purchases are excluded, a fishing card was bought for 2013 by 8404 fishermen. This number translates to 1.9 fishing cards per person. In terms of fishing gear, the highest number of permits was issued for gill net fishing on the sea, followed by permits for fishing with hook gear in nature reserves,

Figure 39. Purchase of recreational fishing rights for different validity terms in 2013
Source: Recreational Fishing Information System of the MoE

Table 34. Data contained in the Recreational Fishing Information System on recreational fishing rights

Fishing right	Fishermen without preferential rights	Fishermen with preferential rights
Fishing with one simple hand line	No data	No data
Fishing with up to three hook gears	Data since 2011	No data
Fishing card	Data since 2004	Data since 2004

Source: Recreational Fishing Information System of the MoE

Table 35. Purchase of recreational fishing rights, 2011–2013

Year	Number of transactions based on different personal ID codes	Total number of persons	Residents of Estonia	Foreigners
2011	44 537	33 824	31 175	1649
2012	70 700	44 802	38 377	6425
2013	90 214	49 125	41 824	7301

Note: data for 2011 are incomplete, because the option of payment via banks was widely used in parallel.
Source: MoE

Table 36. Number of fishing cards issued by fishing gear in 2013

Fishing gear	Fishing grounds	Number of fishing cards issued
Gill net	Sea	5252
Hand line, simple hand line, spinning reel, fly hook, pulling device	Endla, Silma and Matsalu nature reserves	4110
Spinning reel, fly hook	Salmon and sea trout fishing grounds	1749
Gill net	Inland bodies of water	1452
Crayfish trap, dip-net	Rivers and lakes	1011
Spinning reel, fly hook	Brown trout fishing grounds	876
Longline (100 hooks)	Inland bodies of water	722
Gill net	Lakes Peipsi, Pihkva and Lämmijärv	623
Harpoon gun and harpoon	Lakes Saadjärv and Kuremaa	448
Longline (100 hooks)	Sea	215
Hoopnet, dragnet	Lakes	65
Total		**15 900**

Source: MoE

Table 37. Proceeds from commercial and recreational fishing fees (10^3 €), 2004–2013

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Commercial	Trawling	198	134	173	205	183	238	290	197	188	204
	Coastal fishery	409	300	332	224	314	353	318	373	282	318
	Distant-water fishery	383	358	268	288	463	408	231	170	215	174
	Total commercial fisheries	991	793	773	716	960	998	839	740	685	696
Recreational	Fishing card	115	109	096	134	229	166	152	214	198	267
	Fishing fees	198	224	281	288	288	377	364	360	502	514
	Total recreational fishing	313	332	377	422	516	543	516	574	700	781
	Total	**1 304**	**1 125**	**1 150**	**1 138**	**1 476**	**1 541**	**1 356**	**1 314**	**1 385**	**1 477**

Sources: MoE, MoA, Environmental Board

and permits for using spinning reels and fly hooks on salmon and sea trout rivers (Table 36). The lowest number of permits was issued for fishing with hoopnets and dragnets.

Number of recreational fishermen and receipts of fees for fishing rights

Before Estonia regained its independence, fishermen were united, through their member organisations, by the Estonian Fishermen's Society, which operated from 1974 to 1992. Fishing with hook gear (except fishing with one simple hand line) was allowed only to the members of the society. In 1983 there were 46,994 members in the society, which increased gradually, reaching its maximum by the end of 1988, when the membership included 58,294 fishermen (including young people aged under 18 and members of the Dynamo sports society). From 1989 the membership started to decline, at first little by little and thereafter rapidly. There were 43,829 members in the society by the date of its liquidation on 31 December 1992. It was not because people got disinterested in fishing, but because several county clubs (with their members) resigned membership in the central organisation.

After the restoration of independence, fishermen have been unorganised. There are a few clubs, but their membership continues to be less than a thousand. The number of recreational fishermen can thus not be estimated through organisations. Quantitative surveys of recreational fishing in Estonia were conducted in 2010 and 2012 at the request of the Ministry of the Environment. Based on the surveys, the number of recreational fishermen was estimated to be around 300,000 in Estonia. This figure can be reduced by 10%, i.e. the people who, according to the survey, were just assisting in fishing.

Based on the statistics of sales of permits in 2013 and excluding repeated purchases, there were a total of 55,530 buyers of recreational fishing rights and fishing cards, including 8965 foreigners. This figure is less than the sum of buyers of fishing rights and buyers of fishing cards. This is because 1999 fishermen bought both a fishing right and a fishing card in 2013, but in order to find the total number of recreational fishermen each person had to be taken into account only once. Persons enjoying preferential rights (only in the case of recreational fishing rights), who account for around 30% the number of annual and semi-annual permits (based on the statistics of free and paid-for permits issued before 2004) must be added to the final result. According to the sales statistics of 2013, there should be approximately 8000 persons with preferential rights, i.e. around as much as the fishermen who are nationals of other countries. Thus, the number of recreational fishermen living in Estonia could be around 55,000 in 2013. This number does not include those fishing with one simple hand line (the number of such fishermen is not expected to be high) and persons who fail to pay for the fishing right (illegal fishing). Another question is whether the latter can be regarded as recreational fishermen at all. Even if these people are taken into account, the result will still not amount to 300,000, as mentioned in the survey, but would be less than 100,000 according to optimistic estimates.

In 2013, 514,208 euros were received for recreational fishing rights and 266,562 euros for fishing cards. Proceeds from both types of fees have increased compared to previous years (Table 37). In particular, proceeds from the sale of recreational fishing rights have grown, as this fee was raised in early 2012.

Aquaculture

Overview of sector

According to the data of the Veterinary and Food Board, 27 recognised companies were engaged in fish farming (in 29 fish farms) and 20 recognised companies were engaged in crayfish farming in Estonia in 2013 (Figure 40).

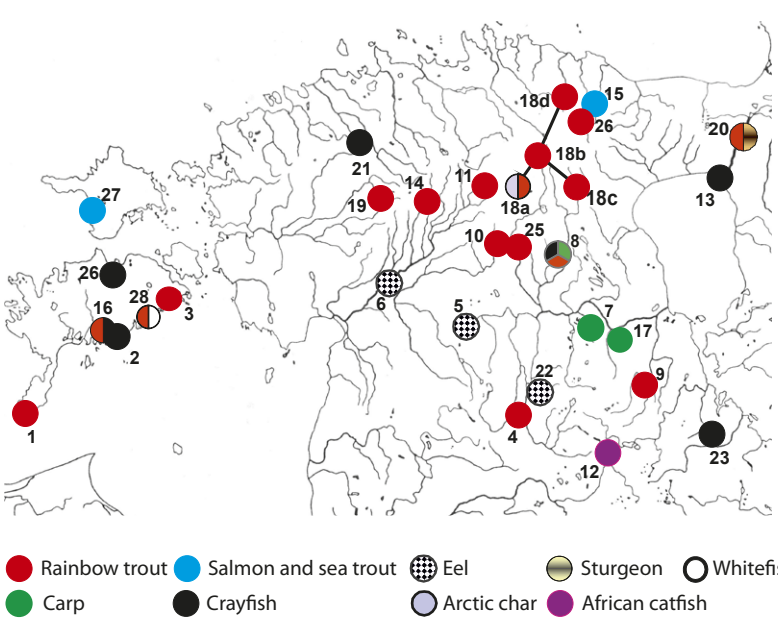
Compared to 2011, the number of active fish farms has increased by four, and the number of crayfish farms has not changed.[3] The diversity of fish farming businesses is large and increasing.

Rainbow trout. Although a number of farms specialising in rainbow trout farming have been built or renovated in recent years, the data of Statistics Estonia indicate that the quantity of rainbow trout sold remains at the level of 2009 (Figure 41). This is caused by several factors. Some of the new farms did not achieve a considerable sales volume in 2013.

Companies producing small trout discontinued this line of business as they were unable to find a market for the production. Some rainbow trout farms were affected by an outbreak of viral haemorrhagic septicaemia in 2013. Neverthe-

[3] Estonian Aquaculture Development Strategy 2014–2020

Figure 40. **Major Estonian crayfish and fish farms in 2013**
Source: EULS



1. Arowana OÜ
2. Astacus OÜ
3. Aquamyk OÜ
4. Beetela OÜ
5. BM Trade OÜ
6. For Angula OÜ
7. Ilmatsalu Kala OÜ
8. Härjanurme Fish Farm
9. Karilatsi kalamajand OÜ
10. Lapavira OÜ
11. Neli Elementi OÜ
12. Paaditalu OÜ
13. Peipus OÜ
14. Piscor OÜ
15. Põlula Fish Farming Centre
16. Pähkla Vähi- ja Kalakasvatus OÜ
17. Riina Kalda's fish holding Carpio
18. Farms of Simuna Ivax OÜ:
    18-a Nõmmeveski
    18-b Antu
    18-c Käruveski
    18-d Mõdriku
19. SK Trade OÜ
20. Störfisch OÜ
21. TP Invest OÜ
22. Triton PR AS
23. Upa Ehitus OÜ
24. Vikerkala OÜ
25. Viru Salmo AS
26. Vähilakk OÜ
27. Õngu Noorkalakasvandus OÜ
28. Ösel Harvest OÜ

Table 38. Estonian fish farming sales volume in tonnes, 2008–2013

	2008	2009	2010	2011	*2012*	2012[1]	2013
Eel[2]	46.0	30.0	20.3	2.0			
Crayfish	0.7	2.0	0.4	0.6	*0.1*	0.1	0.4
Carp	52.3	45.4	39.4	37.5	*38.2*	38.2	43.7
Rainbow trout	333.8	549.0	487.5	333.8	*245.3*	455.3	465.5
Other fish	50.9	28.4	50.9	18.7	*87.2*	87.2	223.5
Total	**483.7**	**654.8**	**598.5**	**392.6**	***370.8***	**580.8**	**733.2**
Fish roe for human consumption	6.7	7.4	4.5	0.1	*4.1*	4.1	5.0

[1] Rainbow trout sales data for 2012 were adjusted on 20 May 2014.
[2] Eel sales data for 2012 and 2013 are included in 'Other fish'.

Source: Statistics Estonia

less, the domestic market of large red flesh salmonids is the largest market sector for farmed fish, and there is certainly potential for sale of farmed in Estonia rainbow trout.

Sturgeons. The farming of various species of the *Acipenser* family is increasingly gaining popularity. Sturgeons are cultivated in net cages in the cooling water of a thermal power station as well as in farms using river water continues. A sturgeon farm was launched in Saaremaa and another sturgeon farm is about to be set up in Pärnu County. The next few years will probably see a significant growth in production volumes, provided that markets are found for the produced fish.

Eel. In February 2013 there were three eel farming companies in Estonia, which produced the fish in recirculation systems. Their total designed capacity was 205 tonnes in 2013; two farms managed to sell their production. Eel prices are declining in export markets and this trend will definitely reduce the operating profit of the companies. Sales in the domestic market and provision of added value to the production would help counterbalance the trend.

Carp. Three pond holdings grow carp in considerable quantities. The sales volume of the holdings has remained at the same level for many years and amounted to 43.7 tonnes in 2013.

Perch. 2013 saw the start of farming perch as commercial fish in a recirculation farm in Pärnu. Estonia's overall position in the exports of wild-caught perch and pikeperch is good and there are well-established channels for selling this production.

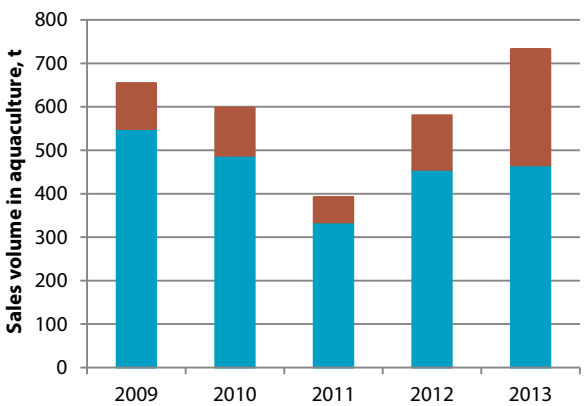


Figure 41. Dynamics of sales volume, 2009–2013
Source: Statistics Estonia

Other farmed species include Arctic char, African catfish and whitefish in Estonia. Small amounts of grass carp and silver carp are farmed as additional fish in carp ponds.

According to the data of Statistics Estonia, the sales volume of fish farming production recovered to the level that prevailed before the intervening years of decline, reaching 733 tonnes in 2013. This growth is attributable to species not specified in the statistics. Typically, rainbow trout accounts for approximately 80% and other species represent 20% of the sales volume of Estonian fish farming production, but in 2013 the share of other species was 36%. Time will tell whether this is a structural change in the production or just a fluctuation limited to one year.

The data collected and issued by Statistics Estonia do not enable accurate conclusions about the sector to be made.

- The classification of species farmed does not correspond to reality and it is therefore difficult to make any conclusions about unspecified species ('Other fish' in Table 38). For example, sturgeon farming, which is becoming increasingly popular, should be reported on a separate row.
- According to data protection principles, it must not be possible to identify the sales volume of a single company from sales figures, unless the company has agreed to it. Therefore, eel is reported under 'Other fish', because a significant portion of eel production comes from just one company.
- The figures of rainbow trout production volumes in 2012 were altered in 2014 and this causes confusion in literature, depending on what data are used (see the different columns for 2012 in Table 38).

Aquaculture Strategy 2014–2020

In 2013 the Estonian Aquaculture Development Strategy 2014–2020 was completed. It had been developed from October 2012 to August 2013 by the Estonian Institute for Future Studies of Tallinn University, the Aquaculture Department of the Institute of Veterinary Medicine and Animal Sciences at the Estonian University of Life Sciences, the aquaculture sector, and representatives of organisations related to the sector.

There are several reasons why a separate strategy was prepared for the aquaculture sector for the first time. First, it was required under the European Maritime and Fisheries Fund Regulation, and second, aquaculture is characterised by fundamentally different problems compared to fisheries.

The substantive part of the strategy consists of an analysis, the vision, objectives and activities, which are grouped into seven main courses of action.

The vision of the strategy is "to build up a leading position in the domestic market of Estonia and become a successful exporter of species that suit local farming conditions and have a high demand on foreign markets".

To accomplish the vision, two objectives have been set:

1. to gain a larger than 50% market share in the domestic market of aquaculture products;
2. to increase the sector's export sales to a level exceeding five million euros.

A need for competent and coordinated leadership and a lack of cooperation between different parties are seen as the most significant bottlenecks in the implementation of the strategy.

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, European whitefish, pike, pikeperch, tench and carp were farmed, and imported glass eels and eel fingerlings farmed in Estonia were stocked into water bodies. Sales of crayfish juveniles for natural water bodies were spreading.

By 2013, the situation had changed considerably. Restocking was essentially limited to salmon, sea trout and eel.

Salmon was stocked into rivers of the Gulf of Finland basin: 99,000 larvae into the Purtse River; 30,000 one-summer-old, 68,000 two-summer-old, 13,000 one-year-old and 31,000 two-year-old fish into the Purtse, Selja, Valgejõgi, Loobu, Jägala and Pirita Rivers. Restoration of the declining salmon population in the Pärnu River basin was a major new initiative. To this end, salmon eggs were collected from the Daugava River in Latvia and fertilised with the milt of male salmon from the same river. According to the data of genetics studies, Daugava salmon is a close relative of salmon living in the Pärnu River and is thus suitable for restoring the population. In 2012, 15 females (approximately 119,230 eggs) and 30 males were used for reproduction. In 2013 the figures were 18 females (approximately 150,220 eggs) and 18 males. Juveniles were farmed on the Põlula Fish Farm. In 2013, 63,000 one-summer-old Daugava salmons derived from the eggs collected in 2012 were introduced into the Pärnu River. The fish that were left to grow will be released into the river in 2014 and 2015.

One-year-old (5500) and two-year-old (7800) **sea trout** farmed on the Põlula Fish Farm were stocked into the Pudisoo River. The Õngu Fish Farm released 20,000 two-year-old sea trout into the water bodies of Hiiumaa.

871,000 **glass eels** (recorded as fry in the statistics) and 141,000 farmed **eels** were released into the water bodies of Estonia in 2013.

The stocking of **Atlantic sturgeon** (Baltic sturgeon, actually *Acipenser oxyrhinchus* originating from Canada) into the Narva River was started. 400 sturgeons weighing 0.1–0.5 kg were released into the river. The fish were tagged, and more than ten of them have already been caught in the Gulf of Finland.

All the restocking activities described above were supported by the state. Fish and crayfish have also been resettled from other water bodies in small quantities and also based on private initiative. The introduction of asp, a protected species, into the Emajõgi River was stopped in 2013 (13,000 individuals were released into the river in 2012).

Research and development

The Estonian University of Life Sciences continued to educate fish farmers at the Master's level. Five Master's theses were defended in 2013. 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 University of Life Sciences conducted two training courses for aquaculture start-ups; both short courses attracted the maximum number of participants.

The first six persons who had been studying fish farming graduated from the Järva County Vocational Training Centre. The construction of farming facilities for experimental research and vocational training was started.

Estonian fish processing industry

General overview of sector

According to the data entered in the Commercial Register, there were 53 companies in Estonia in 2013 (63 in 2012) whose main business comprised the processing and canning of fish, crustaceans and molluscs. Based on the Commission Recommendation 2003/361/EC[4], 81% of enterprises were small, as their average number of employees was up to 49. Largest decrease was in the number of microenterprises that decreased from 31 in 2012 to 22 in 2013. A more detailed overview of the groups of companies is presented in Figure 42.

On average[5], fish processing companies employed a total of 1879 people, most of them (65%) being women. Looking at the age structure of the companies, 37 (70%) of the 53 companies operating in 2013 were more than ten years old. In 2013, the total sales revenue of the companies amounted to 160.8 million euros, with processing and canning of fish, crustaceans and molluscs accounting for 89% of the revenue, i.e. 143.4 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 1.7 million euros.

Fish processing companies had 69 processing facilities, which were mainly located in Harju and Pärnu Counties: 20 facilities in Harju County and 18 facilities in Pärnu County (Table 39).

[4] Commission Recommendation 2003/361/EC divides companies into four groups based on the number of employees: 1) microenterprises – 0 to 9 employees; 2) small enterprises – 10 to 49 employees; 3) medium-sized enterprises – 50 to 249 employees; 4) large enterprises – 250 or more employees

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

Figure 42.
Number of companies whose main business comprised processing and canning of fish, crustaceans and molluscs based on average number of employees in 2013
Source: Commercial Register

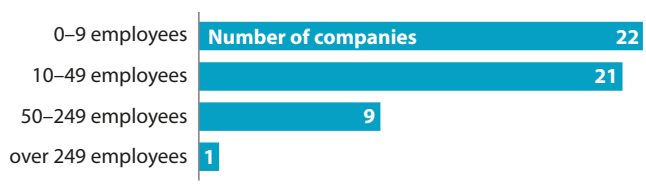


Table 39.Number of processing units of fish processing companies in 2013 by county

County	Number of processing units
Harju	20
Pärnu	18
Saare	8
Tartu	8
Ida-Viru	7
Jõgeva	3
Lääne	2
Lääne-Viru	2
Hiiu	1
Total	**69**

Source: Commercial Register, Veterinary and Food Board

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

The year 2013 was characterised by intensified competition and increases in the value of both raw materials and end production. Compared to 2012 the number of fish processing companies declined slightly (Table 40). In contrast, total sales revenue increased by 10% and the number of employees grew by 13. The average annual wage cost per employee was 8185 euros in 2013, which was 7.6% more than in the preceding year.

Of the 53 fish processing companies, 15 (28%) closed the financial year 2013 with a loss. However, the total net profit was nearly two million euros and the total value added amounted to 24.2 million euros. The combined assets of fish processing companies amounted to 89.9 million euros in 2013, with fixed assets accounting for 50% (45.3 million euros). Investments placed in fixed assets remained at the same level as a year ago (4.1 million euros). The debt ratio, which shows the share of debt (liabilities) in the funding of the assets of companies, increased to 54% in 2013.

The operating expenses of fish processing companies totalled 157 million euros in 2013. Raw materials and supplies accounted for the largest proportion (69%) of the expenses; this increased in comparison with 2012 due to price increases of raw and auxiliary materials. The proportions of labour and energy costs in operating expenses were 13% and 3%, respectively (Figure 43).

If we compare the basic and economic indicators in the different size classes of fish processing companies (Table 41), it appears that over a half (nearly 63%) of the total sales revenue of the fish processing industry in 2013 came from nine

Table 40. Basic and economic indicators of companies whose main business is fish processing, 2008–2013

	2008	2009	2010	2011	2012	2013
Number of companies	59	56	53	55	63	53
Total sales revenue, 10^6 €	124	110	111	130	146	161
Average number of employees	2101	1822	1860	1813	1866	1879
Average annual wage cost per employee, €	6909	6447	6393	7029	7604	8185
Gross value added, 10^6 €	25.2	22.9	20.9	18.3	24.4	24.2
Investments in fixed assets, 10^6 €	7.7	5.4	10.6	9.7	4.2	34.18
Debt ratio,%	54	53	49	50	52	54

Sources: Statistics Estonia, Commercial Register

Table 41. Basic and economic indicators in different size classes of fish processing companies in 2013

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	22	8.5	96	7002	2.8	0.7	1.3	42
10–49	21	44.3	534	8184	18.1	1.1	5.7	54
50–249	9	101.6	999	8956	23.6	2.4	15.4	55
Over 249	1	6.4	250	5558	0.8	0.04	1.7	59

Source: Commercial Register

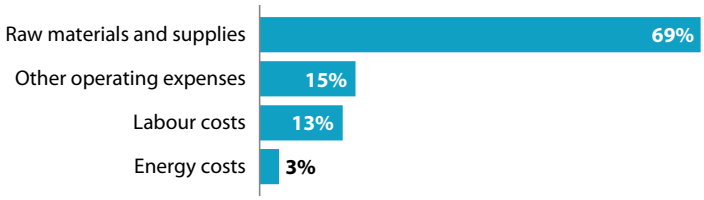


Figure 43. Proportions (%) of operating expenses of companies whose main business is fish processing, 2013
Source: Commercial Register

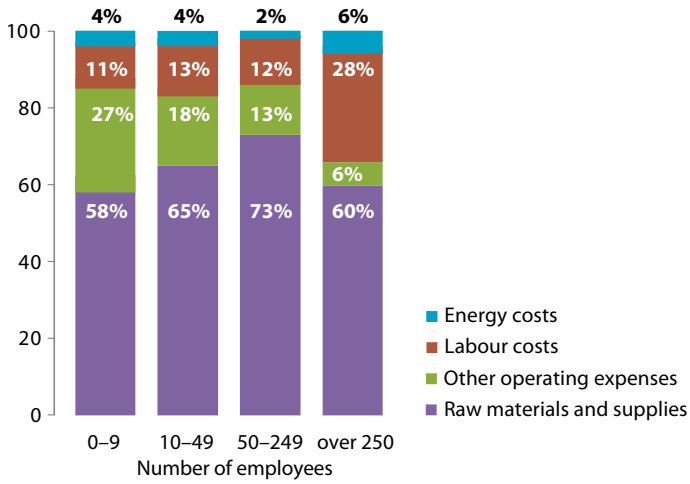


Figure 44. Proportions (%) of operating expenses in different size classes of fish processing companies in 2013
Source: Commercial Register

medium-sized companies, which accounted for just 17% of the total number of companies. This size class also employs the highest number of people (53% of the total number of employees) and has the highest wage cost per employee. In addition, this size class invested the most in fixed assets and produced 64% of gross value added.

Based on the debt ratio, however, medium-sized enterprises were characterised by a high risk level.

The total operating expenses of fish processing companies (157 million euros) were divided as follows in 2013: microenterprises – 8.1 million euros; small enterprises – 44.4 million euros; medium-sized enterprises – 98.3 million euros; and large enterprises – 6.6 million euros. The distribution of operating expenses was similar in these size classes (Figure 44), 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 67,900 tonnes in 2013. Frozen, salted, spiced, dried, deep-frozen and breaded fish accounted for the bulk of production (Table 42).

Compared to 2012, when the production of the Estonian fish processing industry increased considerably (21.4%) after the lowest level in ten years, it shrank by 9.2% in 2013. The fall can primarily be attributed to the decline in the sales of frozen fish (sprat and herring). Given that frozen fish is sold mainly on

Table 42. Production (10^3 t) of Estonian fish processing industry by product type, 2008–2013

Fishery products	2008	2009	2010	2011	2012	2013
Fresh and chilled fish meat, fish fillets, minced fish meat	3.3	4.1	3.7	2.5	2.6	3.2
Frozen fish	30.3	34.6	35.5	32.8	44.2	40.4
Smoked fish	3.8	3.2	1.4	1.9	2.3	2.3
Salted, spiced, dried, deep-frozen and breaded fish	20.8	25.1	19.8	16.5	17.3	14.4
Culinary fishery products in oil, marinade or sauce	1.5	1.7	1.5	1.3	4.7	4.3
Fish preserves	7.1	3.7	5.1	3.8	3.7	3.3
Total	**66.8**	**72.4**	**67.0**	**58.8**	**74.8**	**67.9**

Source: Statistics Estonia

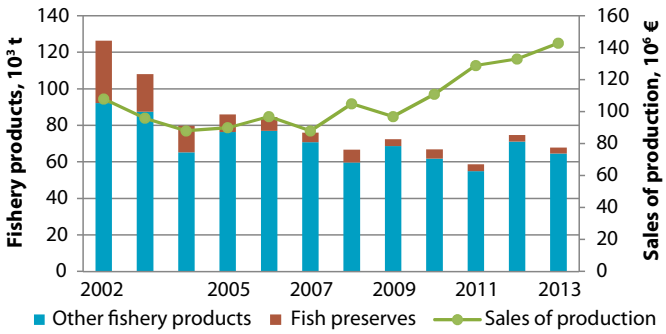


Figure 45. Dynamics of production and sales revenue of fish processing industry, 2002–2013
Sources: Statistics Estonia, Commercial Register

eastern markets, the import restrictions imposed by Russia at the end of 2013 and the difficult political situation in Ukraine played a role in the decline. Although the production volume is generally smaller than ten years ago, the value of the production sold has increased over the years, which can be explained by the increase in the price of the production (Figure 45).

The proportion of exports in fish processing companies' total sales revenue accounted for around 74% in 2013 (Table 43), which indicates the high dependence of the Estonian fish processing industry on exports. Table 44 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 (40,666 tonnes in 2012) and Ukraine (28,594 tonnes in 2012) – decreased in 2013. As in the previous year, Finland was the main country of import with 15,138 tonnes (20,452 in 2012). Table 45 contains data on exports by type of production and source of raw material. All four types of production indicated in the table 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 2013, fish processing companies and producer organisations received fisheries aid to a total value of 1.7 million euros (Table 46) – around 2.6 million euros (61%) less than in 2012. It was mostly aid intended for investments in processing and marketing of fish and development of producer organisations that decreased.

Table 43. Domestic sales and exports of production of fish processing companies, 2010–2013

	2010	2011	2012	2013
Total sales, 10^6 €	111	129	143	161
Domestic market, 10^6 €	30	30	39	42
Exports, 10^6 €	81	99	104	118
Proportion of exports, %	73	76	73	74

Sources: Statistics Estonia, Commercial Register

Table 44. Top ten countries in exports and imports of fish and fishery products in 2013. 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	36 844	Iceland	3 660	Finland	15 138	Morocco	2 211
Ukraine	26 050	Lithuania	3 520	Latvia	12 608	Great Britain	2 211
Latvia	7 533	Kazakhstan	3 140	Lithuania	7 002	USA	1 501
Belarus	5 020	Moldova	2 802	Sweden	4 413	Germany	1 493
Finland	3 821	Germany	2 756	Denmark	3 720	Faroe Islands	1 452

Source: Statistics Estonia

Table 45. 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 46. Fisheries aid granted to fish processing companies, 2011–2013

Aid	Purpose	Amount paid, €		
		2011	2012	2013
Investments in processing and marketing of fish (measure 2.3)	To develop and modernise the processing of fishery products or aquatic plants	4 447 864	1 520 452	552 579
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	2 403 369	2 042 948	329 474
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	444 073	662 238	776 843
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	30 452	24 250	15 603
Training support for producers or processors of fishery products	To partially compensate producers or processors of fishery products for the costs of training of the producers or processors or their employees	9 354	3 278	4 038
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

The following measures and types of action were supported in 2013 under the Operational Programme of the European Fisheries Fund 2007–2013:

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	Collective actions, 'Other collective actions' action
Measure 3.2	Protection and development of aquatic flora and fauna
Measure 3.3	Investment support for fishing ports
Measure 3.4	Development of new markets and promotional campaigns
Measure 3.5	Pilot projects
Measure 4.1	Sustainable development of fisheries areas
Measure 5.1	Technical assistance

Source: https://www.riigiteataja.ee/akt/107052013018

Aid has been granted under the European Fisheries Fund measures in Estonia since 2008 when 13 projects were supported. The number of supported projects has continued to grow since then (Table 47).

In terms of distribution between counties, the largest share of aid was granted and the biggest payments were made to projects carried out in Harju, Pärnu and Saare Counties.

Table 47. Number of projects supported under measures of European Fisheries Fund, 2008–2013

Year	Number of projects
2008	13
2009	183
2010	202
2011	253
2012	337
2013	541

Source: ARIB

In 2013, aid was granted through open calls of proposals under the following measures:

Through **measure 1.1** aid was granted for e.g. decommissioning a fishing vessel, incl. resigning a quota; reassignment of a fishing vessel, incl. acquisition of equipment.

Aid in the total amount of 2,959,900 euros was granted to 7 projects. Payments were made in the amount of 3,024,361.22 euros.

Through **measure 1.3** aid was granted for e.g. acquisition of a galvanised steel wire rope for a fishing vessel; acquisition of a diesel fuel separator; acquisition of a diesel generator; acquisition of main engine connection devices and a hydraulic pump; acquisition of a water pump; acquisition and installation of an air-to-air heat pump; acquisition of a marine radio station, an antenna and an extension cable for the antenna, and installation work; repairs and modernisation of the metal structure of a freight hatch; acquisition of a thruster; acquisition of a metal detector; acquisition of an automated shrimp cooker; installation of a shrimp cooker; acquisition of a heavy fuel preparation module and separators; acquisition of a heavy fuel transfer pump; installation of IFO equipment; acquisition of selective fishing gear; conversion of an auxiliary engine; acquisition and installation of automatic steering; acquisition and installation of a radar; acquisition of a computer suite; acquisition and installation of a navigation system; acquisition of navigation software; acquisition of a captain seat; acquisition of a searchlight; acquisition of a pelagic trawl net; hull work; reconstruction of a vessel's non-work premises; acquisition and installation of equipment located on the main deck; reconstruction of a superstructure on the main deck; acquisition and installation of fire fighting equipment; acquisition of electronic maps for navigation; acquisition and installation of other fishing vessel equipment.

Aid in the total amount of 843,670.01 euros was granted to 14 projects. Payments were made in the amount of 119,016 euros.

Through **measure 1.4** aid was granted for e.g. reconstruction of a superstructure on the main deck of a fishing vessel; acquisition of an engine; acquisition of survival equipment; acquisition and installation of navigation equipment, a GPS, a sonic sounder and a marine chart plotter; reconstruction of an electrical system; hull work; acquisition and installation of engine room equipment; conversion of an engine; acquisition and installation of a diesel engine; acquisition of a safety package conforming to requirements for five people; acquisition and installation of an electric bilge pump and battery; manufacture and installation of a fuel tank and water separator; manufacture of a foundation equipped with rubber bushings for an engine; manufacture of a 6.5 m pound net; manufacture and installation of impregnated cargo hold planks, an engine hood and a stern

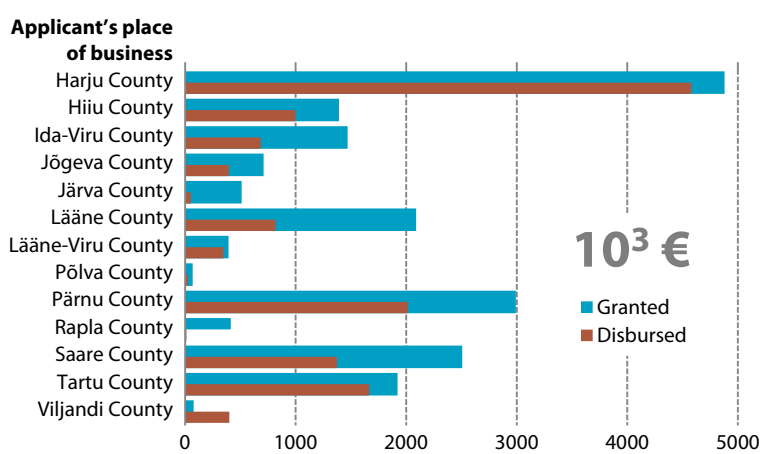


Figure 46. Aid granted and disbursed in 2013 (10^3 €) as at 30 September 2014
Source: MoA

seat; installation of a stainless steel shaft, a screw post collar, a packing, a screw and a rubber buffer, and construction of an engine's hydraulic drive and muffler system; installation of a stainless steel steering system with a tiller, and manufacture and installation of new bulkheads and fore deck (with a hatch); manufacture of side and stern reinforcements; manufacture of a reinforced self-emptying outboard engine well; acquisition of a rescue boat with an outboard engine; cleaning and priming the hull of a vessel and covering it with plastic from the outside; installation of a stainless steel keel guard and gunwale; acquisition of oars; acquisition and installation of a remote control and steering system; acquisition of a powder extinguisher; welding work on the bottom structure of a motor boat; acquisition of seat padding, fishing gear fastening devices, a head light and a ladder for a motor boat; acquisition of a fuel filter and a boat battery, and outfitting a boat; acquisition of a boat engine, a control board and digital displays; acquisition of automatic life-jackets; acquisition of emergency flares; acquisition of first aid kits; manufacture and installation of a bow windlass and a hydraulic winch; manufacture/acquisition of a seal-proof trap net and pelagic net; acquisition of engine room equipment; acquisition of equipment necessary for the work of an autopilot system; acquisition of a net machine; acquisition of a double trap net; acquisition of a floating trap net; acquisition of a hand flare and life raft; acquisition of a portable radio station; acquisition of binoculars, a compass and a navigation camera; manufacture and acquisition of a selective trap net with a height of 1 m; acquisition of an engine clock; acquisition of a sonic sounder; partial replacement of a keel guard, and sanding and painting of a vessel's bottom; manufacture of a wheelhouse, pump pit and engine casing, and acquisition of a portable PVC rain cover; acquisition of a chart plotter, bottom sensor and nautical chart; reinforcement of the bottom of a vessel with waterproof plywood and covering it with plastic; replacement of cabin window panes; acquisition and installation of a net machine; acquisition of a pound net; manufacture of a pull-in winch for a fishing vessel; modernisation of a fishing vessel; acquisition of a net winch and a transport belt; acquisition of a seal deterrent; acquisition of a fish finder; acquisition of life-jackets and hand flares; acquisition and installation of engine room equipment; acquisition and installation of a bilge pump and cargo hold pump; acquisition and installation of electrical wiring, a battery and an automated bilge pump for a fishing vessel; acquisition of a drive shaft, hydraulic steering, motion screw, muffler and other engine room equipment; acquisition of a hydraulic winch, net roller and bow windlass; installation of a hydraulic drive and remote control device of an engine; acquisition and installation of a fish crane and cargo hold pump; acquisition of a selective eel trap with a mouth height of 0.5 m; acquisition of two seal-proof eel traps with a mouth height of 0.5 m; hull work as part of modernisation of a fishing vessel; manufacture of two five-metre pelagic nets; dismantling of the old superstructure and furnishings of a fishing vessel, manufacture of a new bottom reinforcement for the hull, manufacture of new boards, bow and stern decks with plastic hatches, and cargo hold that can be emptied of storm water; manufacture of stainless steel railings, working surface in the stern, and sliding doors and furnishings of the wheelhouse of a fishing vessel; manufacture of a new power system with two separate batteries, and installation of an electrical suction pump and a bilge pump with volume control on a fishing vessel; acquisition of a stainless steel fuel tank (with sensors and fuel

separator), and acquisition and installation of hydraulic steering gear and remote control unit on a fishing vessel; installation of an electro-mechanical hydraulic drive on an engine; dismantling of old furnishings of a fishing vessel, removal of softened fibre glass layers of the hull, manufacture of a new bottom reinforcement for the hull, manufacture of new boards and a new wheelhouse with sliding doors and furnishings; installation of electric trim controls; renovation of a pound net boat and engine; manufacture of additional pulleys for an engine; acquisition of a hydraulically operated mast and lifting boom; acquisition and installation of an electronically controlled hydraulic system distributor; manufacture of three-metre fyke net (smelt); manufacture of a plastic cargo hold; manufacture and installation of an engine hood, engine room planks and a stern seat; manufacture and installation of stainless steel railings (with a breakwater at the bow); installation of an engine oil cooler and water-cooled muffler; acquisition of a laptop; acquisition and installation of a hydraulic net machine; acquisition and installation of a seabed scanner (with a sensor); manufacture and installation of a stainless steel keel guard and a steering system; installation of hydraulic steering gear and a remote control unit; painting the hull of a fishing vessel with EPO paint; acquisition of a new propeller, muffler and exhaust pipe; manufacture of a security console (with windscreen); installation of a safety bracket for an engine; preparation of an application and action plan, and documents supporting the data set out therein (application file).

Aid in the total amount of 1,407,106.94 euros was granted to 154 projects. Payments were made in the amount of 755,639.10 euros.

Through **measure 1.5** aid was granted for e.g. payment of compensation for loss of employment on a fishing vessel.

Aid in the total amount of 40,000 euros was granted to 4 projects. No payments were made in 2013.

Through **measure 2.1** aid was granted for e.g. setting up a perch farm; acquisition and installation of technological equipment; preparation of an application for investment support and an action plan; marking a site with symbols; exercising owner's supervision; preparation of a bore well design; acquisition of a submersible pump; preparation of the final design of a water treatment facility; reconstruction and extension of a water treatment facility and alteration of utility systems; construction of the water treatment facility of a crayfish farm and installation of utility systems servicing crayfish ponds; preparation of the final design of the water treatment facility of the crayfish farm and utility systems servicing crayfish ponds; setting up a fish farm; acquisition and installation of fish farming equipment; setting up an eel farm, incl. acquisition and installation of a control centre and equipment belonging thereto, and preparation of a technological design; preparation of the building design of a fish farm; exercising owner's supervision; acquisition and installation of a plastic swimming pool; construction of the production building of a fish farm; acquisition of the surveillance system of a fish farm; acquisition of a vehicle to be used within a farm; acquisition of production equipment; preparation of application documents.

Aid in the total amount of 2,029,303.21 euros was granted to 6 projects. Payments were made in the amount of 1,161,776.95 euros.

Through **measure 2.2** aid was granted for e.g. acquisition of trap nets for a fishing vessel; acquisition, installation and adjustment of a fish pumping system; conversion of an engine room; replacement of a drive shaft; installation of stern reinforcement; manufacture of a reinforced self-emptying outboard engine well; covering the bottom and sides of a cargo hold; installation of an automated electric bilge pump; acquisition and installation of hydraulic steering gear and remote control unit; acquisition and installation of an outboard engine; acquisition of selective fyke nets; replacement of frame and hull boards, covering the hull with plastic, manufacture of new sides, elimination of drift, acquisition of a stainless steel gunwale; installation of planks in the impregnated cargo space of a fishing vessel; manufacture of railings, working surface in the stern and a wheelhouse; acquisition of a chart plotter and sonic sounder; manufacture of a new power system; hull modernisation; reconstruction of fish storage facilities; manufacture of a bow deck, bow cabin, railing and wheelhouse; acquisition and installation of a radio station; acquisition and installation of a cooling system, water pump, water filter, oil cooler, hydraulic system and water-cooled muffler; acquisition and installation of a hydraulic net machine; acquisition of an onboard computer; cleaning the hull of a fishing vessel and covering it with EPO; reconstruction of a cargo hold so that it can be emptied of storm water, and covering the sides of the cargo hold with fibreglass; acquisition of a radio-controlled trap rope tightening device; acquisition of a hydraulic net winch; manufacture and installation of the sliding doors and furnishings of a wheelhouse and stainless railings; installation of a stainless steel fuel tank (with sensors and fuel separator), hydraulic steering gear and remote control unit; installation of a hydraulic drive for an engine; manufacture of a hydraulic net roller, winch and bow windlass, and installation of a net roller bracket; manufacture of a new foundation (with rubber bushings) for an engine; acquisition and installation of a diesel engine; manufacture and installation of a fishing gear winch; acquisition of a hydraulic fish cleaning drum, fish grader and remotely operated device for laying selective fishing gear; acquisition of binoculars; acquisition of rescue equipment; acquisition and installation of a power washer; acquisition of a dual-controlled bow thruster; preparation of application documents and action plan and making price inquiries.

Aid in the total amount of 861,561.24 euros was granted to 82 projects. Payments were made in the amount of 264,875.77 euros.

Through **measure 2.3** aid was granted for e.g. acquisition of a label printer (with computer and software); acquisition of a forklift with scales; acquisition of a refrigerator truck with accessories; acquisition of a vacuum packaging machine; acquisition of an air heating pump; acquisition and installation of a filleting machine and training of operators; acquisition of a container washing machine; acquisition of a boiler; acquisition and installation of a packaging line; acquisition and installation of a grease trap; acquisition of separators; acquisition and installation of heat exchangers, pumps and switchboards; acquisition of air curtains; acquisition of a van; acquisition of a semi-automatic closing device with a feeding line; acquisition of a thermometer; acquisition of an inkjet printer; acquisition of a fish trimmer; acquisition of a control scale and labelling machine; acquisition and installation of refrigeration equipment; acquisition of a double-lane skinner; acquisition of a packaging machine; acquisition and installation of a portion-

ing line; acquisition of a brine mixer; acquisition of a smoking oven; acquisition and installation of a slicing line; acquisition of a slicing and chopping machine; acquisition of a fish scale remover; acquisition of a fish pumping system; acquisition of a fish sorting and packaging unit (with refrigeration racks); renovation of the roof of a fish processing facility, and reconstruction of a storage, sorting and packaging facility; preparation of the final design of a pumping station; reconstruction of a bore well/pumping station; preparation of a final production building renovation design; acquisition of an automated packaging device; acquisition of an ice machine; acquisition of refrigeration semi-trailers; construction of a cold storage facility; preparation of the final design of the extension of a production building; acquisition of an electric cooker; acquisition and installation of a satellite pallet racking system; acquisition of equipment for production of fishery products; acquisition and installation of an autoclave and steam generator; acquisition and installation of hot and cold smoking chambers; acquisition and installation of two fish drying chambers with drying racks; acquisition and installation of a heating system using residual heat from fish drying equipment; construction of a fishing gear storage facility; reconstruction of a fish collection point; acquisition of an emergency diesel generator; acquisition of an optical sorting machine; acquisition of a power washer; acquisition of ventilation equipment; acquisition of a hot water washer; acquisition and installation of fly traps; acquisition of a strapping machine; acquisition of pumps; preparation of a production building extension and reconstruction design; acquisition of small tool cleaning equipment; acquisition of a processing line with equipment; acquisition of UV lamps; acquisition of a semi-trailer towing vehicle; preparation of an application for investment support, action plan and supporting data.

Aid in the total amount of 3,968,528.43 euros was granted to 26 projects. Payments were made in the amount of 552,578.71 euros.

Through **measure 3.1** aid was granted for e.g. a study of contaminants in fish in the Baltic Sea; improvement of the methodology for assessment of fish stocks in inland bodies of water; modernisation of the equipment and tools needed to assess stocks of commercial fish and improvement of stock assessment methodology at the Estonian University of Life Sciences; acquisition of a fish counter; acquisition of a fish barrier; all other project-related expenditure; improvement of the breeding conditions of sea trout, lamprey and migratory freshwater fish in the rivers of North West Estonia (Stage I).

Aid in the total amount of 950,856 euros was granted to 5 projects. No payments were made in 2013.

Through **measure 3.4** aid was granted for e.g. presenting Estonian fisheries at the Grüne Woche 2014 trade fair; presenting a national display at, and making arrangements for participation in, the following trade fairs: International Boston Seafood Show 2014, PRODEXPO 2014 in Moscow, Seafood EXPO Global 2014 in Brussels, World Food 2014 in Azerbaijan, World Food 2014 in Moscow and SIAL 2014 in Paris.

Aid in the total amount of 988,000 euros was granted to 7 projects. Payments were made in the amount of 776,842.75 euros.

Through **measure 4.1** aid was granted for e.g. development of recipes and packaging of direct marketing products; acquisition of a welding machine; organising training for coastal fishermen; acquisition and installation of an oil cooler and calorifier; acquisition of an electric cooker, dishwasher, dryer, washing machine and vacuum cleaner; acquisition of a LCD multimedia projector; acquisition of a trap net rack on a metal frame; construction of a port's net shed; exercising owner's supervision; preparation of the building design of a net shed; acquisition of a hydraulic timber trailer and lift; organising seminars, conducting training events, renting a tent; two performances of the science theatre of the AHHAA Science Centre; organising fish cooking training courses; designing and printing a poster and flyer; advertising an event in a newspaper; electronic advertising; acquisition of apple juice production and raw juice preservation equipment; acquisition of a log splitter, compressor, planer and milling cutter; construction of the extension of the service building of a holiday resort; acquisition of a power washer; acquisition of a van; acquisition of a cargo trailer; acquisition of a boat trailer; acquisition of a lawn tractor, circular saw, brush cutter and chainsaw; acquisition of a baking pan and gas cylinder; acquisition of a tent; acquisition of a floor scale; acquisition of a cooler, freezer and ceramic stove; acquisition of a vacuum packaging machine; acquisition of a mincer; acquisition of a paella pan; acquisition of a thermo-box and ice pack; reconstruction of the finishing room of a woodworking shop; acquisition of a bale wrapper; acquisition of a hot smoking oven; acquisition of a rowing boat; acquisition of doors; acquisition and installation of sanitary and electrical equipment; acquisition of an extraction module with a kitchen hood and a module chimney system; preparation, design and translation of information materials; design and setup of a website; acquisition of furniture; construction of a fishing bridge and installation of outdoor lighting; acquisition of patio furniture; acquisition and installation of a heat pump; construction of an historic vessel and fitting it with rescue equipment; acquisition of a refrigeration truck; construction and acquisition of two heated mobile lake houses and one non-heated fishing house; construction of a parking lot (with recreation and camping grounds); fairway dredging and surveying; construction and installation of a sliding gate and metal stairs of a fish collection facility; acquisition and installation of vessel maintenance and repair equipment; maintenance of weather stations and web cams; internet connection of weather stations and web cams; organising a fishery-related event in Lake Peipsi region in 2013; acquisition of a diesel forklift truck; acquisition of a forklift; preparation of an application for supporting a project; draining a canal and groundwater control works; reinforcement of banks, incl. supporting underwater part of slopes and covering slopes; digging out a dam; covering roads with gravel and squares with vegetation; design and construction of lighting and power supply systems; acquisition of paddle boats; organising external training in fisheries regions of Finland and Norway; construction and installation of outdoor toilets, shelters, garbage bins and exterior lights; acquisition of a sewing machine; acquisition of a snow blower; acquisition of a honey extractor, wax melting pot and transformer; acquisition of a leaf blower and snow blower; visiting fishery trade fairs; acquisition of speakers, a receiver, a desktop computer and TV sets; acquisition of an espresso machine; acquisition of e-readers; acquisition of a smoke grill; acquisition of an ice machine; acquisition of a mincer and herring wash pump; design

of a bore well; landscaping and installation of a wooden fence at a holiday home; acquisition of cash registers, a software license and payment cards; acquisition and installation of a chimney; acquisition, installation and plastering of a hot wall and stove; acquisition of binoculars; acquisition of a GPS device; acquisition of an outdoor bathtub; acquisition of survival equipment for a boat; acquisition of an electric pepper/salt mill; reconstruction of a quay and slipway; acquisition of a small tractor; construction of an outdoor kitchen; acquisition and installation of surveillance equipment and outdoor lighting; acquisition of a fish pumping system; acquisition of a fish grading line; organising training for an operator and slingers of a rotating or mobile cantilever crane; participation in professional diving courses; manufacture and installation of an information board; acquisition and installation of navigational marking; acquisition of a mobile sawmill with a log moulder; installation of National Geographic's yellow windows and marketing of a region; acquisition of a cleaning appliance with soda sprayer; acquisition and construction of a fishing raft/floating sauna; acquisition of a barrel sauna; design and implementation of a product development concept for a coastal fishery company fishing for valuable fish; acquisition of a vegetable chopper; acquisition of chess boards; transportation and installation of a swing (with slide); development of the visual identity of the brewery of a holiday resort; acquisition, delivery and setup of a cash register system; acquisition of sharpening devices; acquisition of a soft ice cream machine; acquisition and installation of fish drying equipment; preparation of a project application and documents supporting the data set out therein, making price inquiries, and consultations.

Aid in the total amount of 5,377,528 euros was granted to 236 projects. Payments were made in the amount of 242,493.85 euros.

According to the data of the ARIB, calls for proposals were also announced for the following types of projects:

- support for commencing the activities of an association of producers of fishery products, 2013;
- support for commencing the activities of an association of producers of fishery products, second call for proposals in 2013;
- investment support for fishing ports (EFF measure 3.3), call for proposals in 2013;
- practical training support for producers or processors of fishery products;
- training support for producers or processors of fishery products.

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).

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 (Estonian Aquaculture Development Strategy 2014–2020).

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

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

ICES 2014. Report of the Baltic Fisheries Assessment Working Group. ICES CM 2014/ ACOM : 10. 814 p.

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).

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.

NAFO 2013. 2013 Annual Meeting Press Release. NAFO Improves Information Sharing. (http://www.nafo.int/about/media/press/press-2013.pdf).

NIPAG 2014. NAFO/ICES Pandalus Assessment Group Meeting, 10–17 September 2014. NAFO SCS Doc. 14/18 Serial No. N6365.

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. 1–93 (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).

Council Regulation (EU) No 1262/2012 of 20 December 2012 fixing for 2013 and 2014 the fishing opportunities for EU vessels for certain deep-sea fish stocks (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:356:0022:0033:EN:PDF).

Council Regulation (EU) No 297/2013 of 27 March 2013 amending Regulations (EU) No 44/2012, (EU) No 39/2013 and (EU) No 40/2013 as regards certain fishing opportunities (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0297&rid=9).

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

Raid, T. & Doerner, H. 2014. Scientific, Technical and Economic Committee for Fisheries. Review of scientific advice for 2015, part 1 – Advice on stocks in the Baltic Sea (STECF 14-10). JRC Scientific and Policy Reports. Luxembourg. 41 p.

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

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).

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