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Upcoming scenario for the fish canning industry in the Baltic area

Hans Lassen
ICES Secretariat

Available Annually 600 ktons

- Herring
- <300 ktons/year

- Sprat
- <400 ktons/year

Herring and Sprat Landings from Baltic Sea

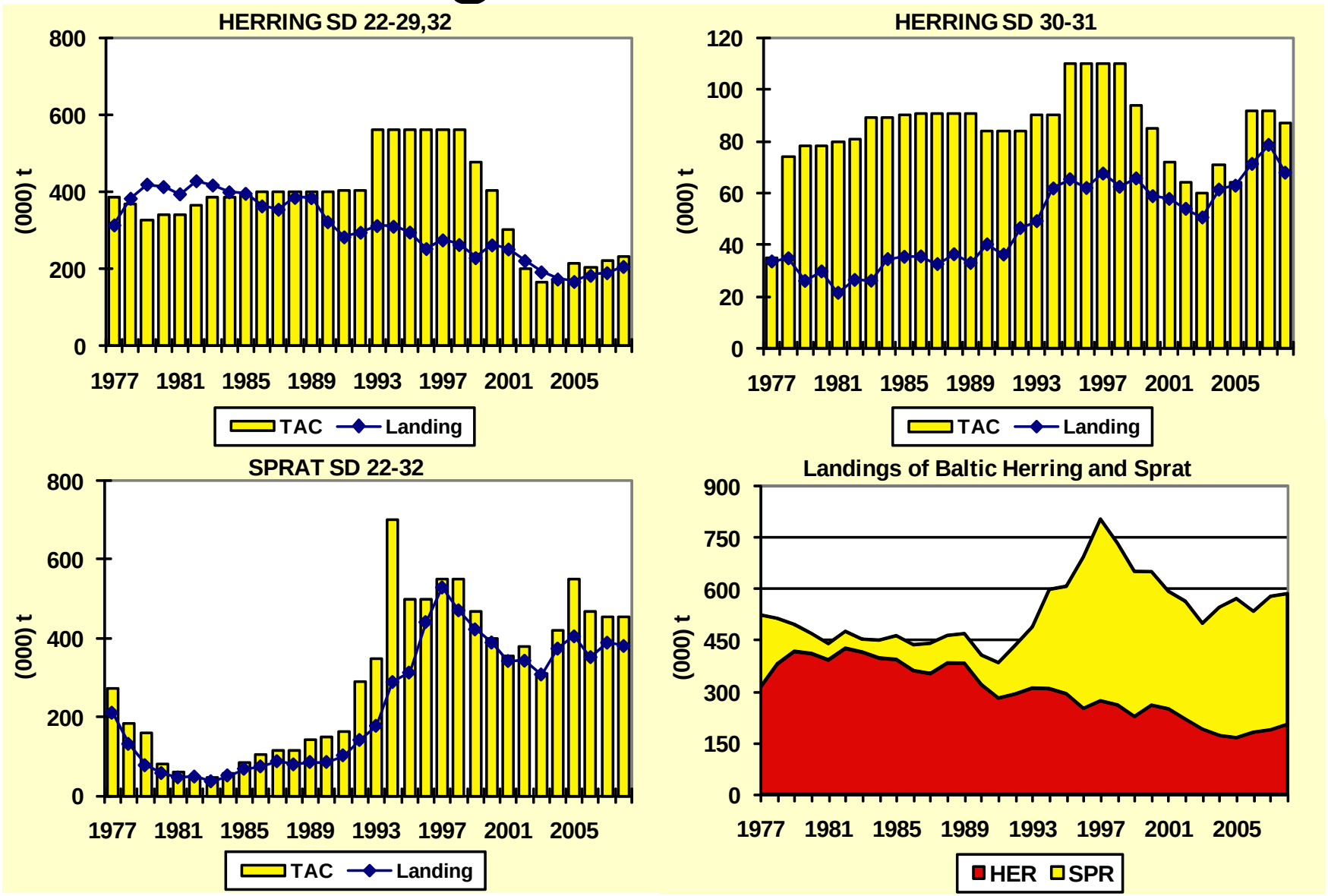
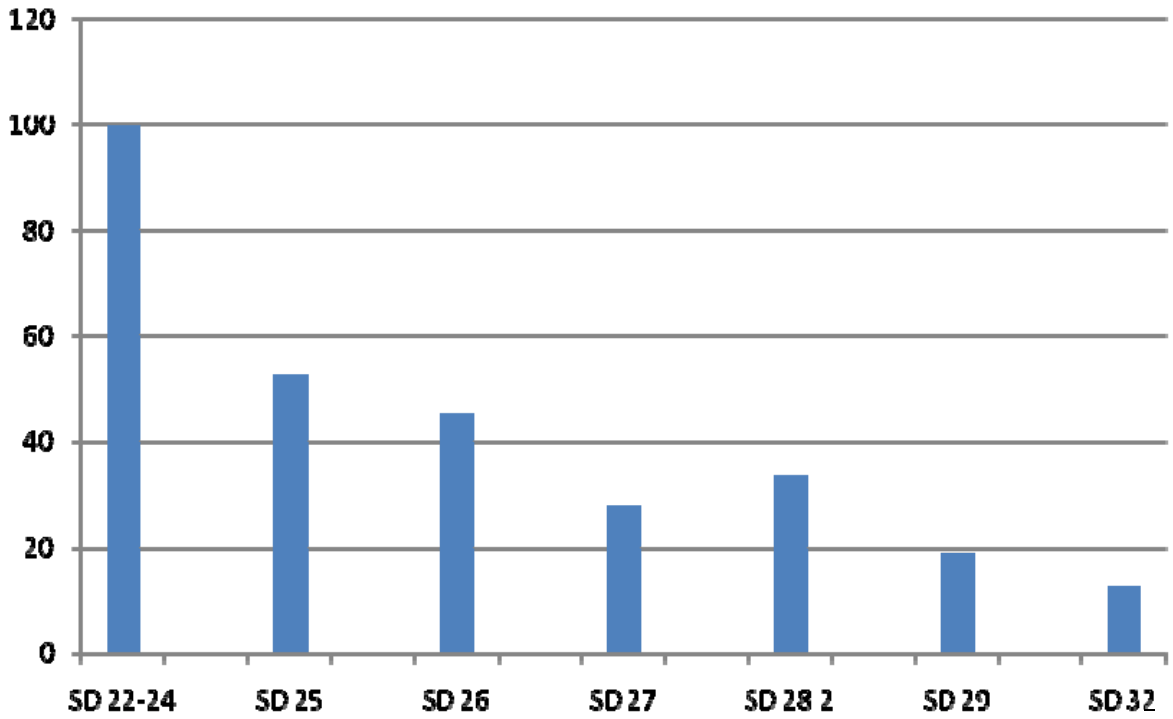


Figure 6.1.1 **Reported landings of herring and sprat and agreed TACs in the Baltic Sea.**

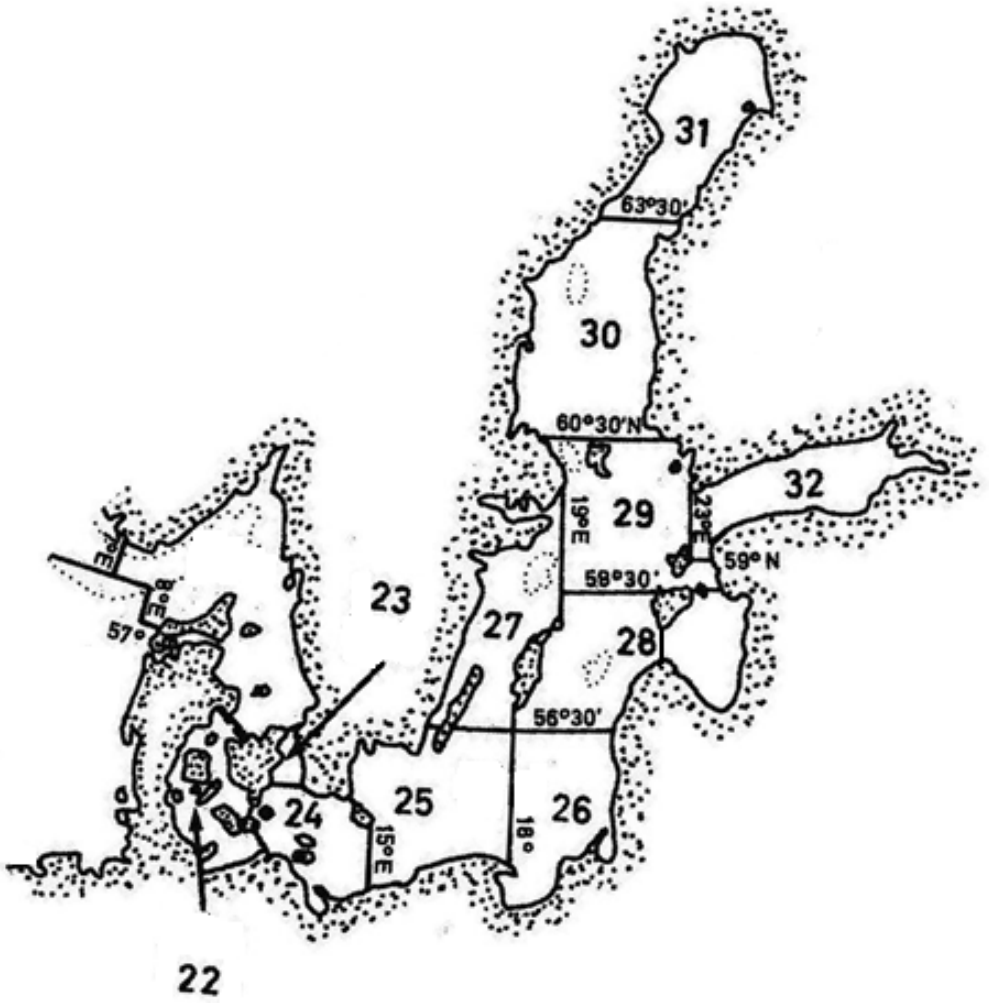
Baltic Herring differs from Western Baltic to Bothian Bay



Mean Weight in catch for Baltic herring by Subdivision

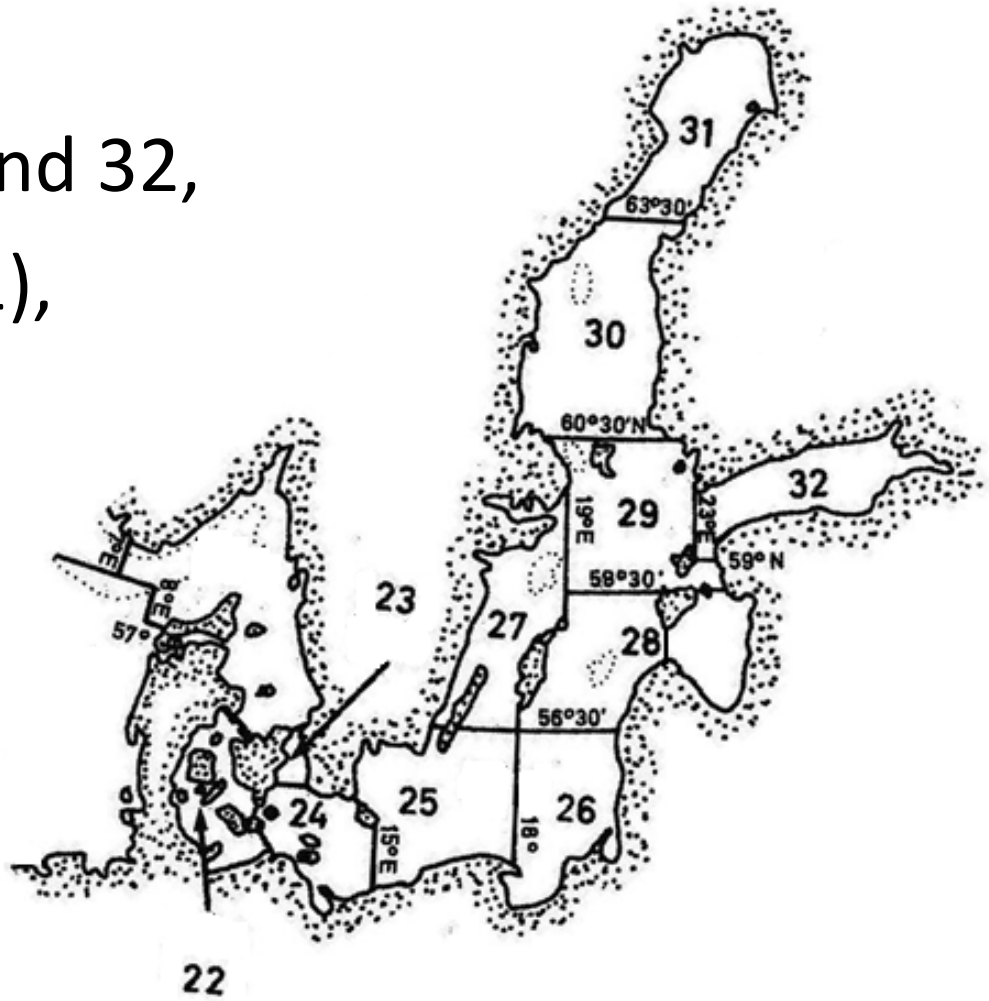
Pelagic Stocks in the Baltic Sea

- **Herring (Stocks)**
  - Western Baltic IIIa + 22-24
  - Central Open Sea (25-29+32)
  - Gulf of Riga (28.1)
  - Bothnian Sea (30)
  - Bothnian Bay (31)
- **Sprat**
  - Baltic Sea 22-29+32



Management Units for Baltic Pelagics TAC

- **Herring**
  - SD 22-24
  - SD 25-27, 28.2, 29 and 32,
  - Gulf of Riga (SD 28.1),
  - SD 30, 31
- **Sprat**
  - SD 22-32



Status of Baltic Pelagic stocks

http://www.ices.dk/advice/icesadvice.asp

Stock	Stock status **in relation to F**	TAC 2009 (t)	ICES Advice 2010 (t)
SPRAT			
SD 22-32	Overfished	454 492	306,000
HERRING			
SD 22-24 + IIIa (Skagerrak-Kattegat)	Overfished	$37.7^{(IIIa)}/27.2^{(22-24)}$	39,800 (incl IIIa)
SD 25-29&32 (excl. GOR)	Harvested sustainably	143 609	103,000
SD 28.1 (G. Riga)	Harvested sustainably	34 892	33,400
SD 30 (Bothnian Sea)	Harvested sustainably	82 669	109,600
SD 31 (Bothnian Bay)	-		No advice (< 3 kt)

Management Plan Proposal Pelagic Stocks

- Plan includes
  - Target fishing mortality
  - Confinement in change of TAC from one year to the next
  - Low SSB triggering remedy action

- ICES evaluated Plan in 2009

Evaluation of EU Management Plan

	Western Baltic herring (*)	Central Baltic herring	Gulf of Riga herring		Sprat
Fishing mortality [A] (year^{-1})	< 0.25	0.22	0.26	0.35	0.40
Annual TAC variation [B] (± percentage)	15	15	15	20	20
Spawning-stock biomass trigger [C] (‘000 t)	None	800	60		400
Probability of SSB_{2015}<[C]	< 5% (**)	< 5%	< 5%		< 5%
B_{lim} (‘000 t)	110 (***)	385	40		200
When SSB<B_{lim}	F = 0	F = 0	F = 0		F = 0
F when B_{lim}<SSB_y<[C]	Not Applicable	0.22*[(SSB_y-385)/(800–385)]	0.26*[(SSB_y-40)/(60–40)]	0.35*[(SSB_y-40)/(60–40)]	0.40*[(SSB_y-200)/(400–200)]
Spawning-stock biomass in 2015 SSB_{2015} (’000 t)	(*)	1 056	117	101	962
Yield in 2015 Y_{2015} (’000 t)	(*)	190	24	29	256

Ecosystem effects of a sprat stock reduction

- **Herring**: Increased growth and improved condition and subsequently an increase in biomass of herring due to reduced competition with sprat;

- **Cod**: Reduced control of cod recruitment by sprat due to lower predation on eggs and *P. acuspes*;

- **Zooplankton and Phytoplankton**: Weakening of the trophic cascades leading in spring to increased *P. acuspes* and in summer to increased total zooplankton as well as decreased phytoplankton biomass; Modelling of the lower trophic levels in food-web models needs to be improved. Indirect effects of species interaction for the recovery of the cod stock not included in the models.

- **Sprat**: Increased growth and condition of sprat due to reduced intra-specific competition and hence a higher quality food supply for seabirds.

- **Fishing down the sprat stock or improved abiotic conditions will only lead to a cod recovery if the fishing pressure on the cod stock is significantly reduced**

Long-term Perspectives

- If cod recruitment continues to fluctuate around the average level observed over the most recent 15 years, the herring and sprat HCR options given above perform reasonably well.
- Regime shift flipping from a Pelagic dominated to a Demersal system
- If cod recruitment is higher than in recent years (by a factor of 2.25, which is still much lower than in the 1980s), the target Fs [A] for herring and sprat are too high to maintain the stock above the trigger SSB levels with confidence.
- However, an increase in the mean weight of herring to the level of the 1980s could compensate for the higher level of cod recruitment.
- Keep HCRs under review to take account of the dynamic nature of marine ecosystems.

Regime Shifts

SYSTEM	PERIOD COVERED	REGIME SHIFT 1	REGIME SHIFT 2	REGIME SHIFT 3	REGIME SHIFT 4
Øresund	1979–2005		1987/88	1995/96	
Central Baltic Sea	1974–2006		1987/88	1994/95	
Gulf Riga	1974–2006		1988/89	1997/98	
Gulf Finland	1979–2007		1988/89	1995/96	2002/03
Bothnian Sea	1979–2006	1982/83	1988/89		
Bothnian Bay	1979–2006		1987/88	1993/94	
COAST	1971–2006	1976/77	1987/88		2004/05