Future Fisheries for Food Production

A 10-year Perspective on Socio-Economic Growth

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Note: This report was translated into English with the assistance of artificial intelligence. While the translation has been reviewed, minor inaccuracies may remain.

Summary

The Swedish Baltic Sea fishery is currently strongly oriented towards large-scale reduction fisheries, with the majority of herring landed in Denmark. This means that most of the value added is generated outside Sweden. The value added accruing to Sweden from reduction fisheries amounts to approximately SEK 4–5.5/kg, while processing into food in Sweden can generate SEK 142–359/kg. Sweden can significantly increase value creation from Baltic Sea fisheries by shifting the focus from exporting raw material to domestic food production, provided that fish stocks recover and are managed sustainably. The report shows that a transition in which 60 per cent of the herring quota is used for human consumption and processed in Sweden could increase annual value creation by up to approximately SEK 3 billion already at current quota levels. In the longer term (2035), with recovered stocks, the potential is estimated at approximately SEK 14 billion per year from herring and approximately SEK 5 billion per year from cod, i.e. a total of around SEK 19 billion per year in socio-economic value. To enable such a transition in the herring fishery, investments of approximately SEK 500 million are required in three new processing facilities along the east coast. This could create around 150 jobs (direct and indirect), while strengthening regional development and food security.

1. Introduction

"Thirty years ago, the Baltic Sea provided substantial value in the form of fish for human consumption and opportunities for recreational fishing. Today, these values have diminished to a fraction of their former level. What remains is primarily fishing for animal feed, carried out on fish stocks that continue to decline in a vicious cycle. The sparse stocks and the reduced size of individual fish make fishing for human consumption relatively unprofitable" (Fölster, 2024, p. 3).

This report takes as its starting point the development of Swedish Baltic Sea fisheries towards today's large-scale so-called reduction fisheries, i.e. fisheries that to a very large extent supply fish as an input to foreign feed production. The report focuses on herring fisheries in the Baltic Sea and how these can expand as stocks recover in line with a precautionary approach to fishing. More specifically, the report describes how herring fisheries for human consumption in the Baltic Sea generate (or fail to generate) *socio-economic value*, i.e. social value such as employment and coastal development, as well as the investments that would be required in selected east coast towns to enable such fisheries. These values have been lost as Swedish Baltic fisheries have gradually shifted from (coastal) fisheries for human consumption to fisheries dominated by industrial-scale operations that export large volumes of Swedish fish abroad. The report describes the current situation as well as two scenarios for Swedish herring fisheries in the Baltic Sea in terms of the socio-economic value generated. Overall, it provides an account of the potential socio-economic value that Swedish herring fisheries could deliver if the share of catches used for human consumption (or export of food fish) were increased, both in the near term and after approximately ten years of stock recovery.

2. Socio-Economic Values – Created, or not Created, by Swedish Baltic Sea Fisheries

2.1 How are Socio-Economic Values from Swedish Fisheries Calculated?

The socio-economic values that Swedish fisheries can generate in general terms—that is, employment, capital, potential exports, as well as investments along the Swedish coast to enable food production based on Swedish fish—are in this report calculated as the total value added across all stages of the value chain for Swedish fish. In this report, this means that the value added per kilogram of fish includes wages, interest, taxes, depreciation, and premises costs, i.e. revenues minus costs at each stage of the value chain (Statistics Sweden, 2023). The value added from Swedish fisheries thus represents the sector's contribution to the Swedish economy.

Value added can be calculated at different levels. The Swedish Agency for Marine and Water Management's statistics on the value of Swedish fisheries for 2023 cover only the first stage of trade (Swedish Agency for Marine and Water Management, 2024), i.e. sales from vessels to the first recipient. However, Waldo and Lovén (2019) point out that the majority of the value added from Swedish fish is generated late in the value chain. A more accurate way of calculating the value added from Swedish fisheries, which includes all income generated for the regional economy and thus also for Swedish GDP, includes fishing-associated added value, producerassociated added value and retail-associated added value (Solér, 2025).

The *fishing-associated value* added is based on an estimate whereby 80 per cent of the price of fish is estimated to count as value added (BalticWaters, 2024). *The producer-associated value* added is divided into the wage share (approximately 63.5 per cent of the producer's total value added, see AMECO, 2025) and the remaining portion, which consists of the capital share of the producer's value added in the form of profits and depreciation. In this report, as in the report "Swedish fisheries and socioeconomic value" (Solér, 2025), capital and wage shares based on available data and calculations relating to Skillinge Impex are used as a proxy for all calculations. This simplification means that the producer-associated value added is, in all likelihood, subject to significant uncertainties. However, the figures/proxies used for wage and capital shares in this report do not affect the relative differences between the value added for various herring-based food products. The *retail-associated value* added consists of 90 per cent of the price charged in-store for fish, minus 4the purchase price (Ekonomifakta, 2025) and includes the many work processes applied to the raw fish in the shop/retail environment (for example, cleaning, filleting, as well as preparing and storing it appropriately) to meet demand, which requires skills, equipment and logistics that increase the degree of processing of the raw fish. Added to this value-added figure is the 12 per cent food VAT.

2.2 Economic Value from Large-Scale Baltic Sea Fisheries – Current Situation

Large-scale pelagic herring fisheries in the Baltic Sea generate very limited social value, as the value added from this herring is created in Denmark. However, the economic value is significant. In 2024, 3,488,746 kg of herring caught by Swedish vessels in the Baltic Sea was delivered to Danish industry/the animal feed industry. Approximately 70 per cent of landings were made in Skagen. The price per kilogram of fish varied depending on the landing port. Herring landed in Skagen fetched a price of approximately SEK 3.8/kg, while catches landed in Grenaa, Nexø, and Thyborøn fetched an average of SEK 5.3/kg (see Table 1). Swedish small-scale coastal fishermen receive approximately SEK 5/kg for herring when selling to FF Skagen (for feed production), which collects the fish by truck in Sweden (in Norrsundet/on Öland) (see Solér, 2025). The value added accruing to Sweden from the first stage of the value chain for reduction fisheries in the Baltic Sea, with landings in Denmark, amounted to SEK 14,931,099 in 2024.

Fish species (Swe)	Country (Landing port)	Landing port	Use	Weight (kg)	Price (SEK)	Price per kg (SEK)
Sill/Strömming	Denmark	Gilleleje	Consumption	20,018	206,886	10.3349
		Grenaa	Industry/animal feed	835,592	4,392,270	5.2565
			Consumption	773	4,112	5.3197
		Neksø	Industry/animal feed	70,027	354,844	5.0672
		Skagen	Industry/animal feed	2,434,749	9,346,792	3.8389
		Sletten	Consumption	19,355	214,012	11.0572
		Thyborøn	Industry/animal feed	148,378	837,193	5.6423

Table 1. Swedish Baltic Sea catches of herring in 2024 landed in Denmark, broken down by fisheries for human consumption and reduction fisheries. (Source: Swedish Agency for Marine and Water Management, 2026)

This statistic is consistent with earlier data on landings from the Swedish pelagic fishery, where the majority of fish caught within the pelagic system was landed in Denmark during the period 2012–2022. During this period, most of the Swedish pelagic catch was landed in Skagen (Solér et al., 2023). The report "Development of a regional/local sustainable business model for innovation and the blue economy in fisheries in the +8 fjords area" describes the integration between Swedish pelagic fisheries and feed/fishmeal production in Denmark. The feed producer FF Skagen in Skagen is approximately 25 per cent owned by FF Skagen Fond, in which Swedish fishermen were represented on the board up to 2022 (FF Nyt, Feb 2023). This Swedish ownership helps explain the large volumes of Baltic herring landed in Skagen. The exact extent of Swedish ownership is not publicly disclosed. In 2022, Swedish pelagic fishermen in FF Skagen Fond were represented by Dick Höglund, who that year served as chair of the Swedish Pelagic Federation PO (SPF) (Svenssons Nyheter, 2022). The Swedish ownership in FF Skagen's processing plant in Skagen may also explain the relatively low price per kilogram of herring delivered there (see Table 1). It is likely that the relatively low price is compensated by capital income linked to ownership. Swedish fishing companies often establish Danish subsidiaries that hold shares in FF Skagen A/S via FF Skagen Fond. These companies are taxed in Sweden on their income, with credits for Danish capital taxation (Nordisk Etax, 2026). Denmark's dividend tax is 27 per cent, but under the Nordic tax agreement Denmark may only tax dividend income at 15 per cent.

The economic benefits associated with Swedish pelagic fisheries' ownership in FF Skagen largely depend on the conditions and reduced risks that come with ownership influence. When Swedish fishing companies establish Danish subsidiaries, they have greater opportunities to acquire shares in fish-processing companies such as FF Skagen (Proff, 2026). The price per kilogram of fish delivered is likely more stable over time, providing predictability and control over income. In addition, there are capital returns from ownership, value appreciation of these holdings, and not least the opportunity to acquire Danish fishing quotas (Fiskeristyrelsen, 2023). In 2022, it was reported that the companies Astrid Fiskeri A/S (DKK 1.2 billion) and Themis Fiskeri A/S (DKK 500 million) purchased Danish quotas in 2017 and subsequently acquired additional industrial quotas for approximately DKK 1.7 billion in 2022 (DR, 2022).

Since the value added from fish landed and sold to Danish companies only covers the first stage of trade, the contribution to economic value in Sweden is limited to the income generated from this sale. Beyond this value added, the economic contribution includes employment for those working on Swedish fishing vessels supplying fish to Denmark (wages and taxes), as well as capital income for those holding ownership shares in Danish feed plants. The number of jobs on Swedish pelagic vessels is estimated at 480–613, which is assumed to represent approximately two-thirds of total employment in Swedish commercial fisheries (BalticWaters, 2025). However, this figure refers to the entire pelagic fishery in Sweden. There is therefore considerable uncertainty regarding how many jobs are directly linked to pelagic fisheries supplying Skagen in Denmark. Approximately 75 per cent of pelagic landings were delivered to Denmark during 2022–2023 (Solér et al., 2023), which suggests that, on average, around 400 jobs are generated by pelagic Baltic Sea fisheries whose catches are landed in Denmark for feed production.

2.3 Economic Value from Large-Scale Baltic Sea Fisheries – Potential

The potential of large-scale Baltic Sea fisheries in terms of economic value is strongly dependent on the status and development of fish stocks, as well as Sweden's management of these stocks. Unfortunately, several commercial fish stocks in the Baltic Sea have been in decline since 1990, despite fishing quotas for all stocks having decreased over time (ICES, 2024). Some stocks have been almost entirely depleted, such as cod, and large-scale fishing for herring has contributed to smaller individual fish and weaker stocks. This makes it relatively more profitable to fish for the animal feed industry, as herring for human consumption requires comparatively larger fish (Fölster, 2024). This development in the Baltic Sea's ecosystem raises concerns about the future ecological scope for continued large-scale reduction fisheries in the region.

The war in Ukraine has created a situation in which Sweden's food security has come into focus in national fisheries policy. There is growing concern about the availability of fish as an important source of protein in Sweden, particularly in times of war or crisis (Swedish Food Agency, Swedish Board of Agriculture, National Veterinary Institute, 2024), which is likely to influence Swedish fisheries management going forward. Strengthened food preparedness will require a larger share of Baltic

Photo: Amanda Öberg

Sea fisheries to be directed towards human consumption (ibid). The Swedish Food Agency reports that food producers in Sweden have very limited capacity to supply sufficient quantities of safe food in situations of heightened preparedness or war (ibid). At the same time, the fisheries industry and fishing fleets in the EU are becoming increasingly consolidated, leading to specialisation and geographical concentration, with negative effects on small-scale coastal Swedish fisheries and fish-processing industries that supply fish for human consumption to the Swedish population (Swedish Board of Agriculture, 2024).

Given both the vulnerable state of the Baltic Sea ecosystem with declining fish stocks and Sweden's need for enhanced food security, in which domestic fisheries play a central role as a source of protein, it is likely that large-scale reduction fisheries in the Baltic Sea will decrease over time. Moreover, the socio-economic cost of this type of fishing is high due to subsidised fuel consumption and carbon emissions. In his report, Stefan Fölster (2024) shows that this value is negative: the net cost to society of large-scale reduction fisheries in the Baltic Sea amounts to SEK 205 million per year.

2.4 Baltic Sea Fisheries for Human Consumption – Current Situation

In 2023, approximately 5,000 tonnes of herring were caught for human consumption in the Baltic Sea by Swedish fishermen, corresponding to 17 per cent of Swedish-caught herring in the Baltic Sea (Fölster, 2024). According to statistics for herring fisheries in the Baltic Sea using passive gear for vessels with home ports from Haparanda to Simrishamn, an average of 53,700 kg per year was caught during the period 2017–2023 (Source: Swedish Agency for Marine and Water Management in Solér, 2025). It is likely that these catches were used for human consumption. Using active gear over the same period, an average of 1,946,319 kg of Baltic herring was caught. A share of these catches using active gear is landed in Denmark.

2.4.1 Baltic Sea Fisheries for Human Consumption Landed in Denmark – Current Situation

Baltic Sea herring catches intended for human consumption landed in Denmark amounted to 40,146 kg in 2024 (see Table 1). The fish is landed in Sletten, Grenaa, and Gilleleje in Denmark, where it is sold to local actors who process and sell it on a small scale. The average price was SEK 8.8/kg for Baltic herring landed for human consumption in Denmark in 2024 (see Table 1). The value added accruing to Sweden from the first stage of the value chain for consumption fisheries in the Baltic Sea landed in Denmark totalled SEK 425,010 in 2024.

2.4.2 Baltic Sea Fisheries for Human Consumption Landed in Sweden

Baltic Sea fisheries for human consumption are dominated by herring fisheries (see Solér, 2025). For fisheries using passive gear, vendace is by far the most common species caught, followed by herring. Fisheries using active gear are dominated by herring and sprat. Herring catches have varied significantly over the period 2017–2023, with a sharp decline in 2021–2023 when sprat increased (see Tables 2 and 3).

	2017	2018	2019	2020	2021	2022	2023
Horned dace				7,800			
Herring	1,982,377	2,324,393	2,019,086	3,655,196	1,390,927	1,295,665	956,593
Sprat	1,146,931	1,010,575	1,252,373	1,318,434	1,260,376	1,933,788	1,563,057
Gudgeon				4,100			
Cod				357			

Table 2. Landings by vessels using active gear and with home ports from Haparanda to Simrishamn, by species, 2017–2023 (kg). (Source: Swedish Agency for Marine and Water Management)

	2017	2018	2019	2020	2021	2022	2023
Gudgeon					6		
Id					188		
Salmon	1,324	1,940	2,568	993	509.7	810	2,051.5
Roach		8				3	
Nors		21	208	141	146	252	591
Whitefish					130	37	19
Coregonids	29	92.2	121	163	752.9	1,406	227.7
Vendace	106,011	136,374.5	87,973	177,462	188,800	297,337	429,534
Herring	21,738	56,362.2	47,312	86,547	91,805	183,787	72,132.5
Flounder				38			
Brown trout					6.6		
Other marine species		2,517					

Table 3. Landings by vessels using passive gear and with home ports from Haparanda to Simrishamn, by species, 2017–2023 (kg). (Source: Swedish Agency for Marine and Water Management)

The total value added from Baltic Sea herring fisheries intended for human consumption can be calculated by summing all value added across all stages of the value chain for herring used in food production. As described in Section 2.1 above, the total value added for herring used for human consumption - that is, the contribution of production to the regional economy and thereby to Swedish GDP - includes all income associated with fishing (fishery-related value added), processing (producer-related value added), and retail (retail-related value added) (see Solér, 2025). The value of herring catches for human consumption landed in Sweden thus depends on how much and what type of value is added to the herring as it is processed into food and sold.

2.4.2.1 Baltic Sea Fisheries for Human Consumption Landed in Sweden

To calculate the total current value added of Baltic Sea herring processed into food, this report uses the figures in Table 5 as a proxy for fishery-related value added for surströmming production (BalticWaters, 2023). It is assumed that the 4,952,974 kg of Baltic Sea herring landed in Sweden for human consumption in 2024 (see Table 4) had an average value of SEK 7.12 per kg, which closely corresponds to figures from the report Swedish Fisheries and Socio-Economic Value (Solér, 2025).

Use HER Baltic Sea 2024 – landed and sold in Sweden					
Fish species (Swe)	**Country (Landing port)**	**Use**	**Weight (kg)**	**Price (SEK)**	**Price per kg (SEK)**
Herring	Sweden	Industrial/animal feed	359,675	1,063,031	2.96
		Consumption	4,952,974	35,266,521	7.12

Table 4. Baltic herring landed in Sweden in 2024. (Source: Swedish Agency for Marine and Water Management)

The total value added for three different types of herring based on Baltic Sea fisheries is presented in Table 9. These value added figures range between SEK 142–359 per kg for herring and should be compared to the value added of approximately SEK 4/kg generated by Baltic Sea herring sold to FF Skagen in Denmark (Solér, 2025). The calculations are presented in Tables 6–8 below.

Processing of Herring into Fried Herring, sold in IMPEX Retail Store at SEK 130/kg

1 kg of fresh herring to the producer of fried herring	SEK
Selling price fishermen	7.1
Fishing-related added value	5.7
VAT	0.7
Total fishing-related added value	**6.4**

1 kg of herring from fishermen to plate as fried herring via producer and shop	SEK
Fishing-related added value	6.4
Producer-associated value added	
- *Wage share*	6.9
- *Capital share*	4.6
Retail-related value added	110
VAT	14
Total fishing-related value added	**142**

Table 5. Calculation of value added for 1 kg of herring sold as fried herring in retail store

Processing of Herring into Fermented Herring for Retail Sale

For fermented herring, I have used an average retail price of SEK 343/kg for herring processed into surströmming and sold to consumers in the grocery retail sector (ICA, 2026).

1 kg of fermented herring sold to consumers 2026	SEK
Selling price fishermen	7.1
Fishing-related added value	5.7
Producer-associated value added	
- *Wage share*	6.9
- *Capital share*	4.6
Retail-related value added	301
VAT	41
Total fishing-related value added	**359**

Table 6. Calculation of value added for 1 kg of fermented herring sold to private consumers in 2024

Processing of Herring into Smoked Herring for Retail Sale at SEK 221/kg

(Source: Bergmans Fisk, Norrsundet)

1 kg of smoked herring sold to consumers in 2026	SEK
Selling price fishermen	7.1
Fiskeassocierat förädlingsvärde	5.7
Producer-associated value added	
- *Wage share*	6.9
- *Capital share*	4.6
Retail-related value added	192
VAT	24
Total fishing-related value added	**233**

Table 7. Calculation of added value for 1 kg of smoked herring sold to private individuals in 2024

How the Calculations Were Made

These added value figures are based on the following assumptions (see Solér, 2025): (1) fishermen sell herring to processors for SEK 7.1/kg (see table), (2) a *fishing-associated value added* based on an estimate whereby 80 per cent of the price of fish is estimated to count as value added (BalticWaters, 2024), (3) a *producer-associated value added* divided into a labour share (approximately 60 per cent of the producer's total value added; see AMECO, 2025) and the remaining portion (40 per cent), which consists of the capital share of the producer's value added in the form of profits and depreciation. Capital and wage shares based on available data and calculations relating to Skillinge Impex in 2021 have been used as a proxy for all calculations. The figures/proxies used for wage and capital shares in this report do not affect the relative differences between the value added for different categories of fishing in this report other than marginally, (4) a *retail-associated value added* comprising 90 per cent of the retail price charged for fish, minus the purchase price (Ekonomifakta, 2025), and (5) a food VAT rate of 12 per cent.

The Total Value Added for Processed Swedish Baltic Herring Intended for Human Consumption

To calculate the added value generated by current herring fishing in the Baltic Sea intended for human consumption, a number of assumptions must be made. If we assume that the quantity of herring – 4,952,974 kg – landed and sold for human consumption in 2024 was divided equally between the production of fried, fermented, and smoked herring (1,651,000 kg for each type of product), the total value added would amount to SEK 1.2 billion (SEK 1,211,834,000).

Fishing category and species	Added value in 2024 per kilo of fish calculated using 2026 prices (SEK)	Total value added in 2024 for 1,651 tonnes calculated using 2026 prices (SEK)
1 kg of herring processed into fried herring via producer and shop	142	234,442,000
1 kg of herring processed into fermented herring via producer and shop	359	592,709,000
1 kg of herring processed into smoked herring via producer and shop	233	384,683,000

Table 8. The total added value of different categories of processed Baltic herring

The calculation shows that Sweden's economy, in particular the parts where herring is processed and sold, benefits economically to a very high degree in terms of jobs, taxes and capital gains.

2.5 Potential for an Increased Contribution to Sweden's GDP if a Larger Share of Baltic Herring Were Processed into Food in Sweden

To estimate the *socio-economic potential* of increased landings and processing of Baltic herring in Sweden, I have compared: (1) the value added per kilogram of herring at the first stage of the value chain from Swedish Baltic Sea herring landed in Denmark with, (2) the total value added per kilogram of herring accruing to Sweden through the processing and consumption of this herring in Sweden. The analysis is based on the data in Table 1 and on the economic potential of shifting from reduction fisheries supplying Denmark to herring fisheries for human consumption landed and processed in Sweden. I further assume that the herring processed into food in Sweden - rather than being sold to the feed industry in Denmark - is used in equal parts for the production of fried herring with a total added value of SEK 142/kg, smoked herring with a total added value of SEK 233/kg, and fermented herring with a total added value of SEK 359/kg (which may represent an added value level similar to serving herring in a restaurant, i.e. within the higher range of the added value for 1 kg of herring).

The following illustrative calculation shows that every kilgrom of herring that is landed as input for Danish feed production instead of being landed and processed into food in Sweden represents a loss to the Swedish economy of SEK 241/kg. In this calculation, it is assumed that 70 per cent of the herring caught in Swedish waters and landed for feed production in Denmark has a total value added of SEK 3.8/kg, whilst 30 per cent of these landings has a total value added of SEK 5.3/kg (see Table 1). Note that capital income from Swedish fishermen's ownership stakes in, for example, FF Skagen is not included in this calculation, as no data of such income are available.

2.5.1 Economic Potential per Kilogram of Herring when Switching from Reduction Fisheries Supplying Denmark to Fisheries for Human Consumption Landed and Processed in Sweden

70 per cent of the Swedish-caught herring landed for feed production in Denmark has a total value added of 3.8 SEK/kg, while the remaining 30 per cent of these landings has a total value added of 5.3 SEK/kg (Table 1). A weighted price is SEK 4.25/kg (3.8 x 0.7 + 5.3 x 0.3 = SEK 4.25/kg), which represents the value added in the first stage of the value chain. This price should be compared with the average total value added across all stages of the processing chain in Sweden for herring processed into food. With equal shares of fried herring production with a total value added of SEK 142/kg, smoked herring with a total added value of SEK 233/kg and fermented herring with a total added value of SEK 359/kg, the average total added value is (142 + 233 + 359) / 3 = SEK 245/kg. The following illustrative calculation shows that for every kilogram of herring landed as input for Danish feed production, rather than being landed and processed into food in Sweden, the Swedish economy loses approximately SEK 241/kg (SEK 245 – SEK 4.25/kg).

2.5.2 Value Chain Integration Increases the Potential for Economic Gains when Shifting from Reduction Fisheries to Fisheries for Human Consumption, Landed and Processed in Sweden

The economic potential of a transition from reduction fisheries to fisheries for human consumption processed in Sweden depends largely on how much Baltic herring can be landed and processed domestically, but also on how the value chain from fishing to consumer is organised and structured. In the context of increased fisheries for human consumption, it is crucial to draw lessons from the structural gains achieved when fishing and fish processing are integrated, as is the case in the Danish reduction fisheries sector. As I outline in section 2.2 above, there are significant advantages when fishermen hold ownership stakes in production companies. In the case of reduction fisheries, such ownership influence helps to minimise risks associated with landings and price fluctuations. It is likely that the same mechanisms apply to fisheries for human consumption. That is, if fishermen supplying raw material to value-adding processing facilities along the Swedish coast have some degree of ownership and thereby influence, they benefit from stable prices and secure outlets for their catch. In addition, capital income accrues to fishermen, which can be reinvested in

vessels intended for fishing for food. This suggests that industrial models for fisheries for human consumption - where fishing is integrated with processing capacity, similar to the pelagic model, and where fishermen own part of the production - can help ensure long-term viability, financial stability, and risk reduction for both fishermen and processing units.

3. Scenario for Increased Socio-Economic Value from Baltic Herring Processed into Food under the Precautionary Principle

A prerequisite for increased fishing for human consumption in the Baltic Sea is that fish stocks stop declining and that the size of individual fish stops decreasing. Without viable stocks and sufficiently large fish, fishing for human consumption is not profitable (Fölster, 2024). This means that an increase in profitable fishing for human consumption in the Baltic Sea requires changes that strongly support the growth of, among other things, herring stocks in the Baltic Sea. To estimate the potential for increased socio-economic value from Baltic herring processed into food over time, I base the analysis on a precautionary scenario (Fölster, 2024), which assumes that: (1) fish stocks in the Baltic Sea can recover, which is evidenced, for example, by the recovery of herring in the Gulf of Riga, cod around Iceland, the trawling ban in the Øresund, and North Sea herring (see Fölster, 2024), (2) fish stocks recover slowly, and (3) the recovery period allows only small-scale coastal fishing for human consumption.

An operationalisation of such a precautionary scenario that ensures the recovery of fish stocks in the Baltic Sea (Fölster, 2024) allows for 60 per cent of the Swedish herring quota to be caught and landed for human consumption in Sweden, while the remaining 40 per cent is reserved for large-scale pelagic fishing outside Sweden's economic zone. To estimate the socio-economic added value of fishing under this precautionary scenario, it is necessary to calculate: (1) the difference in landing values between fish caught for reduction fisheries and for human consumption, (2) the value accruing to the Swedish economy if 60 per cent of the herring quota is landed in Swedish ports and processed into food in close proximity to these ports or elsewhere in Sweden, and (3) the regional and local economic value accruing to the communities where food production facilities and ports are located or established.

3.1 Difference in Landing Values for Fish Caught for Feed Versus Food under the Precautionary Principle – the Example of the 2024 Swedish Baltic Herring Fishery

Year of landing	Sea area	Fish species (MAF)	Fish species (Swe)	Quantity (kg)
2024	Baltic Sea	HER	Herring	21,203,794
		SPR	Sprat	38,681,690

Table 9. Quota-deducted catches by Swedish vessels in the Baltic Sea in 2024. (Source: the Swedish Agency for Marine and Water Management)

A precautionary approach based on the assumption that fish stocks recover slowly implies that 60 per cent of the Swedish herring quota is reserved for human consumption, while 40 per cent of this quota is allocated to industrial reduction fisheries outside Sweden's economic zone. In this report, the estimation of potential socio-economic value from Baltic herring processed into food is based on this percentage allocation of the Swedish herring quota in the Baltic Sea for 2024. Table 9 shows that in 2024, 21,203,794 kg of herring were caught in the Baltic Sea by Swedish vessels. A precautionary fishing scenario would imply that 12,722,276 kg are caught for human consumption (60 per cent of the 2024 quota-deducted herring catches in the Baltic Sea), and 8,481,517 kg are caught and delivered for feed production in Denmark (40 per cent of the 2024 quota-deducted herring catches in the Baltic Sea).

3.1.1 Potential Socio-Economic Value from Baltic Herring under the Precautionary Principle – Landing Values at the First Stage of the Value Chain

To calculate the landing value at the first stage of the value chain based on potential fishing under the precautionary principle, where 60 per cent of the herring quota is allocated to human consumption (12,722,276 kg), we need to know the following:

- The total actual value of large-scale pelagic catches delivered to the Danish animal feed industry in 2024 amounted to SEK 14,827,170.
- Total actual value of herring catches for human consumption in 2024 (see Section 2.5.1 for calculations) amounted to SEK 35,265,174.
- A precautionary quota for fisheries for human consumption: 60 per cent of the 2024 herring quota (12,722,276 kg at an average of SEK 7.12; see Section 2.4.2.1 for calculations), yields a potential first-stage landing value of SEK 90,582,605.
- A precautionary quota for large-scale pelagic reduction fishery: 40 per cent of the total 2024 herring quota (8,481,517 kg at SEK 4.25; see Section 2.5.1 above for calculations), yields a first-stage landing value of SEK 36,046,447.
- The difference between the potential value of the precautionary quota (based on total utilised 2024 Baltic herring quotas), amounting to SEK 90,582,605 + SEK 36,046,447 = SEK 126,629,052, and the actual values (based on 2024 utilisation statistics for Baltic herring), SEK 14,827,170 + SEK 35,265,174 = SEK 50,092,344, is SEK 76,536,708 (SEK 126,629,052 – SEK 50,092,344).
- The added value at the first stage of the value chain from fishing under the precautionary principle would amount to SEK 76,536,708.

	Large-scale pelagic catches delivered to the Danish animal feed industry in 2024 (SEK)	Herring catches for human consumption landed in Sweden in 2024 (SEK)	Total Swedish Baltic herring catch (SEK)
Total actual value in 2024	14,827,170	35,265,174	50,092,344
Potential value of the precautionary quota based on utilised quotas in 2024	36,046,447	90,582,605	126,629,052
Potential added value of fishing in accordance with the precautionary principle based on the 2024 quota allocation	21,219,277	55,317,431	76,536,708

Table 10. Potential added value at the first stage of the value chain from fishing Baltic herring under the precautionary principle for pelagic reduction fisheries and fisheries for human consumption, compared with actual fishing in 2024

3.1.2 Potential Socio-Economic Values from Baltic Herring under the Precautionary Principle – Landing and Processing in Sweden

The potential socio-economic value from Swedish fishing of Baltic herring under the precautionary principle also includes the value created by landing and processing herring in Sweden. This means that we use the calculation in Section 2.5.1 above, where Swedish-caught herring landed for feed production in Denmark has a weighted price of SEK 4.25/kg, representing the total value added, since only the value added in the first stage of the herring value chain accrues to the Swedish economy, while the remaining value accrues to the Danish economy. This is compared with the average total value added of herring processed into food, which amounts to SEK 245/kg.

The potential added value in terms of total value added for reduction fisheries, where 40 per cent of the 2024 herring quota (8,481,517 kg) would have been sold to the Danish animal feed industry at

SEK 4.25/kg, corresponds to the same amount as the landing values at the first stage of the value chain, since the remaining value increases accrue to the Danish economy. The potential added value in terms of total value added from herring fishery for human consumption processed in Sweden amounts, under the precautionary principle where 60 per cent of the Swedish herring quota for 2024 (12,722,276 kg) is landed in Sweden, to SEK 3,116,957,620 at SEK 245/kg.

3.1.3 Potential Socio-Economic Balues from Increased Fishing of Baltic Herring for Human Consumption under the Precautionary Principle – Regional Economic Values from Investments in Production Capacity and Potential New Ports

To provide a comprehensive picture of the added value, in terms of contributions to Sweden's economy, that Baltic herring fishing under the precautionary principle could generate, it is necessary to include both investment costs and the economic contributions arising from these investments. In this report, I assume that processing 60 per cent of Sweden's Baltic herring quota into food in Sweden requires investments in production capacity (processing herring into food), and to some extent potentially also in ports.

Under the precautionary principle, catches intended for human consumption amount to 12,722,276 kg (where 60 per cent of the Swedish herring quota based on the 2024 quota allocation is landed in Sweden). To estimate what port and production capacity would be required to process this quantity of herring into food in Sweden, I make assumptions based on Sweden's current, and to some extent historical, landing and production capacity for Baltic herring. Producing food from herring requires port capacity, as well as capacity for sorting, filleting, freezing, cooking and packaging, and, where applicable, storage capacity.

3.1.3.1 Estimated Investment Costs for Production Facilities and Ports Intended for Increased Food Production based on Baltic Herring Vaught in Accordance with the Precautionary Principle

To map these investment costs, I begin by assessing existing capacity in Sweden. This is followed by estimating the landing and production capacity that would be required to process 12,722,276 kg of herring into food in accordance with the precautionary principle (60 per cent of the Swedish Baltic herring quota).

Current Swedish Capacity for Food Production based on Baltic Herring

Today, only two production units in in Sweden (Simrishamn and Nogersund) exist along the Swedish Baltic Sea coast where herring can be landed, sorted, and processed. A potential additional unit for landing and production exists in Karlskrona, where the fish processing factory Foodia Fisk AB (Saltö), which went bankrupt in 2010, could potentially be reopened if investment capacity is available. On the west coast, there is a facility in Ellös, which currently processes North Sea herring for human consumption (Swedish Board of Agriculture, 2026). The Ellös factory has a potential processing capacity of 1,000 tonnes per week in a single shift and 2,000 tonnes per week in two shifts.

Potential Production Facilities with Ports

In 2024, Simrishamn received 3,720,707 kg of herring (see Table 11), which was likely processed into food by Impex Skillinge. Nogersund received 1,265,810 kg of herring in 2024, which was processed into food. Nogersund's receiving and sorting capacity can be increased to three times its current level, to approximately 3,800 tonnes, provided that investments are made in sorting facilities. The production capacity in Nogersund has a maximum limit of 3,500 tonnes of herring per year. I therefore assume that the current production facilities with associated ports that process herring have an annual capacity of approximately 5,000 tonnes. This implies that there is currently a shortfall of approximately 7,700 tonnes of capacity in order to produce food from the 12,722,276 kg of herring that, under the precautionary principle for Swedish Baltic herring fisheries, would be required (60 per cent of the Swedish Baltic herring quota).

Year of landing	Sea area	Landing port	Fish species (MAF)	Fish Species (Swe)	Quantity (kg)
2024	Baltic Sea	Nogersund	HER	Herring	1,265,810
			SPR	Sprat	316,634
		Simrishamn	HER	Herring	3,720,707
			SPR	Sprat	2,638,916

Table 11. Swedish landings in Nogersund and Simrishamn in 2024. (Source: the Swedish Agency for Marine and Water Management)

Food production requires daily deliveries of herring to ensure the highest possible value added per kilogram of finished food product, and it is primarily necessary that the fish is caught and landed by vessels that "depart and land in the same port within the same day." Therefore, production facilities need to be established along the Baltic Sea coast.

Potential Ports Requiring Production Facilities

The ports along the Baltic Sea coast that are approved landing ports and where processing facilities have previously been in operation are primarily Västervik and Karlskrona. Slite on Gotland is also a port where a potential processing facility could be established. All of these ports are approved as landing sites for fishing vessels under (HVMFS 2017:8, see Swedish Agency for Marine and Water Management, 2026). In addition, there is Norrsundet, which is currently used as a landing port for EU fishing vessels landing herring and sprat (Swedish Agency for Marine and Water Management, 2026) for onward transport by truck to Skagen FF's feed production facilities. According to 2024 statistics, Norrsundet was the largest fishing port in Sweden, with just over 16,000 tonnes of fish landed per year (SVT, 2025).

It is reasonable and realistic to invest in production facilities with sorting, freezing, and processing capacity in close connection to three existing ports: Norrsundet, Slite, Västervik, and Karlskrona. These locations represent a geographical distribution of production capacity along the Swedish Baltic Sea coast, with the exception of Öland, where there is also a significant need for processing capacity. Historically, the Västervik facility (now Östersjöfabriken AB) has produced 100–200 kg of food per week based on herring from Öland.

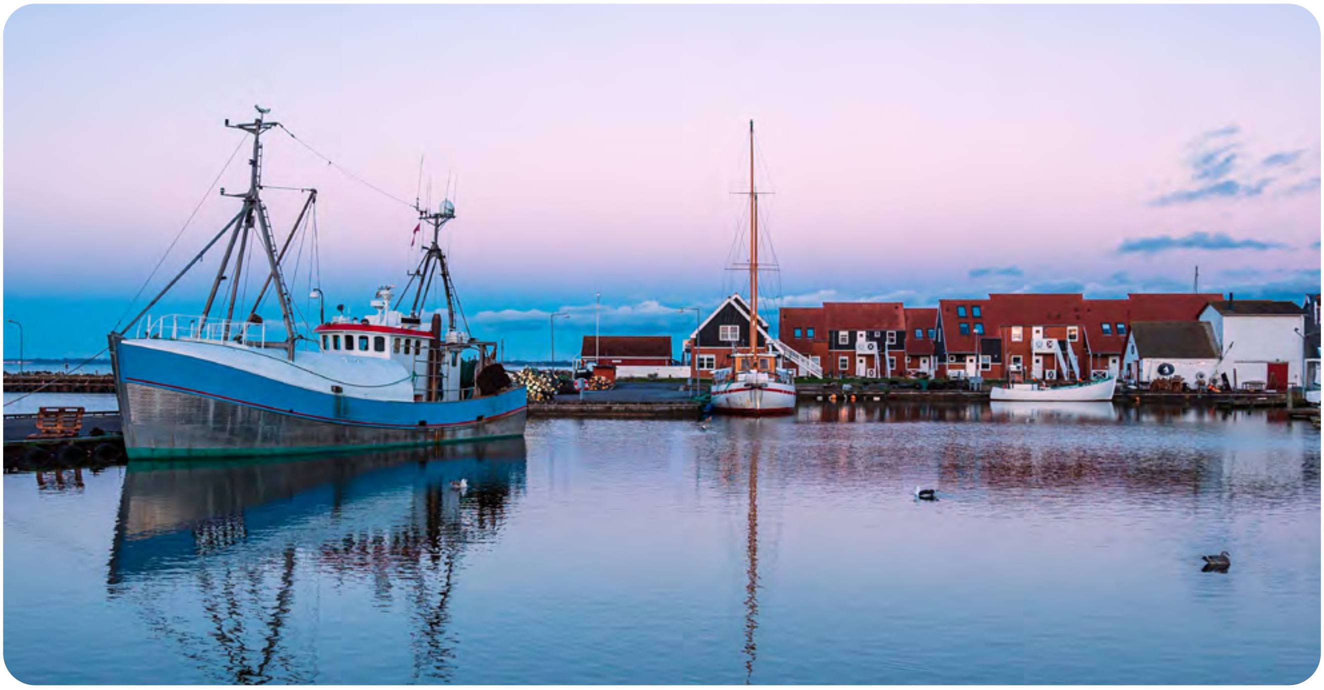


Photo: RicoK69, iStock

Costs of Establishing Processing Facilities along the Swedish Baltic Sea Coast

To estimate the cost of the investments required to build up food production based on herring along the Baltic Sea coast in Västervik, Karlskrona, Slite, and Norrsundet, I have used a CAPEX model (UC, 2026) and AI. CAPEX (Capital Expenditures) refers to expenditures on new development or new investments, and in investment contexts CAPEX calculations can be used as part of an investment appraisal (see IFRS, 2026).

The common baseline assumptions used to estimate investment costs for establishing Swedish processing capacity for food production based on Baltic herring are as follows:

- Each proposed processing unit is based on 2,500 tonnes of herring per year via port
- Each proposed processing unit produces: 30 per cent fried (tray/MAP), 30 per cent pickled, 30 per cent frozen (10 per cent loss/waste)
- Production: approximately 1,600 tonnes of finished food per year
- Designed to handle seasonal peaks
- No dedicated by-product processing

The CAPEX model indicates that establishing a processing plant in Västervik requires the lowest level of investment, while production in Norrsundet and Slite requires higher investment due to the absence of existing production capacity in these locations. In the case of Slite, this is driven by high estimated transport costs (transport to the mainland). Given the substantial uncertainties in estimating investment and operating costs using the CAPEX model and AI, the calculations summarised in Table 12 below should only be interpreted as an indication of the relative differences in investment and annual operating costs for processing facilities in four different locations along the Swedish east coast.

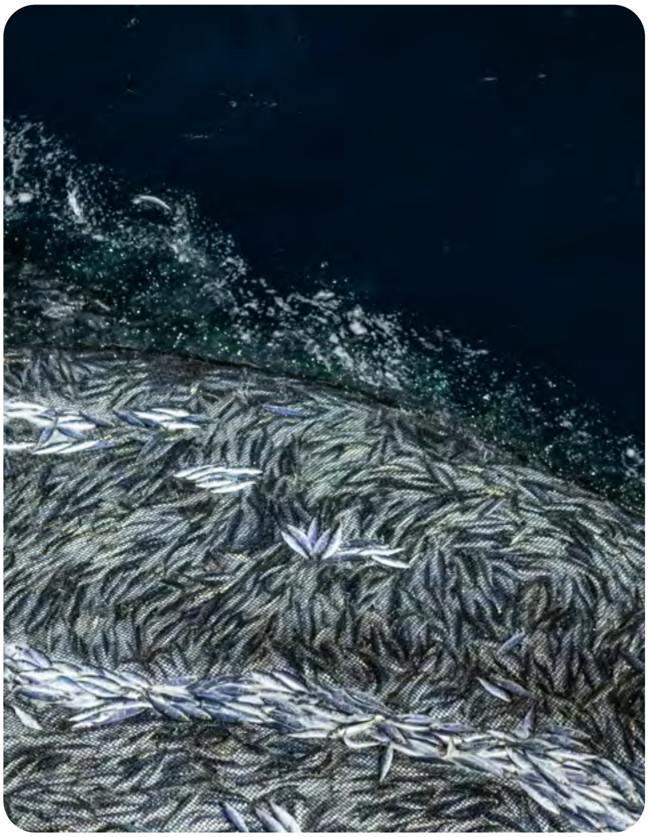
	Västervik	Karlskrona	Norrsundet	Slite
Investment cost (SEK million) CAPEX	165	171	180	185
Annual operating costs (SEK million) OPEX	38	39	40	42

Table 12. Differences in investment and annual operating costs for plants in four different locations along the Swedish east coast based on AI calculations using the CAPEX model

To land and process the portion of the precautionary quota (60 per cent) that Sweden currently lacks the capacity to process - approximately 7,500 tonnes of capacity is currently missing - three new plants would need to be built, each with the capacity to receive approximately 2,500 tonnes of herring per year for food processing. In addition to the proposed investments in production capacity, I suggest a greater integration of fishing and fish processing activities. Such integration, in the form of fishermen holding ownership stakes in processing facilities, would over time make fisheries for human consumption more profitable as herring stocks grow and the share of larger herring increases (in line with precautionary fishing principles, see Fölster, 2024). Another form of integration would involve fishermen-owned processing facilities for by-products (i.e. parts of the catch that cannot be used for food production), which could potentially increase fishermen's incomes. Both of these ways of linking (integrating) fishing, food processing, and value addition from parts of the catch that cannot be processed into food would increase fisheries' ability to contribute to the investments required to expand Sweden's food production based on Baltic herring. Experience from pelagic fisheries' ownership in FF Skagen (described above), shows that this type of value chain integration can support individual fishermen's financial margins and strengthen their investment capacity.

Income from Establishing Processing Facilities along the Swedish Baltic Sea Coast

The economic contribution to the regional economy, and thereby to Sweden's GDP, from building a fish processing factory does not only come from the sale of these food products, but also from the jobs created by these facilities. In addition to the jobs created during the construction of production units themselves, I estimate that each factory creates 20–30 jobs, and using an average of 25 full-time jobs across three factories, a total of 75 full-time jobs would be created, distributed across the locations Västervik, Karlskrona, Norrsundet, and Slite.



In addition to these direct jobs, I estimate that indirect employment will be created according to an employment multiplier of 1.8–2.1 (Industrinyheter, 2023; Teknikföretagen, 2023). This implies that the employment generated by three new factories processing Baltic herring into food is expected to total approximately 150 jobs, distributed evenly across the four locations Västervik, Karlskrona, Norrsundet, and Slite.

These 150 jobs, which are dependent on the establishment of new facilities producing food from Swedish Baltic herring, each have the potential to contribute approximately SEK 1.20 million per year to Sweden's economy in terms of GDP on average (Statistics Sweden, 2025a and 2025b). The total value of these jobs would amount to SEK 180,000,000 per year.

4. Scenario for Increased Potential Socio-Economic Values from Baltic Herring Processed into Food under the Precautionary Principle in 2035

To provide an overview of how increased socio-economic values from Baltic herring processed into food may contribute to the Swedish economy over time, this section estimates the potential socio-economic values from such herring fishery under the precautionary principle in 2035. This calculation is based on an estimated 100 per cent increase in the total Baltic herring quota in 2025 of 40,025 tonnes (Source: Swedish Agency for Marine and Water Management). Of this allocated quota, 31,900 tonnes of herring were caught, of which approximately 74 per cent was used for feed production (Source: Swedish Agency for Marine and Water Management).

A 100 per cent increase in the Swedish herring quota implies a quota of 80,050 tonnes of herring in 2035. Allocated according to the precautionary principle, where 60 per cent of the quota is caught and landed for human consumption and 40 per cent is caught by large-scale pelagic fisheries outside the Swedish economic zone (Fölster, 2024), this implies that approximately 48,030 tonnes of herring can be caught for human consumption and 32,020 tonnes for the feed industry.

The precautionary scenario described in Stefan Fölster's report (Fölster, 2024) implies that the cod stock in the Baltic Sea recovers. ICES assessed that a recovery of the cod stock was possible in 2015. In that year, the total cod quota in the Baltic Sea amounted to 41,400 tonnes, of which Sweden's share was 16,010 tonnes. Based on the ICES assessment, we assume under the precautionary scenario that the Swedish cod quota amounts to 31,600 tonnes in 2035.

4.1 Scenario for Increased Socio-Economic Values from Baltic Herring and Cod Processed into Food under the Precautionary Principle in 2035

4.1.1 Herring as Food – Contribution to the Swedish Economy in Terms of Socio-Economic Value in 2035

A herring fishery of 48,030 tonnes for human consumption in 2035 has a total value added based on an indexation of the 2025 value added. I have adjusted the value added per kilogram of processed herring in 2025 for the three different herring products presented above: fried, smoked, and fermented herring. I have indexed the per-kilogram prices of these products using the CPI with fixed interest rate (CPIF), which is an inflation measure showing price developments for Swedish households excluding changes in interest rates (Riksbanken, 2026; Statistics Sweden, 2026). Assuming an annual inflation rate of approximately 2 per cent (in line with the Riksbank's inflation target, measured as CPIF), the total value added per kilogram of processed herring is indexed to 2035. For fried, smoked, and fermented herring, the total value added per kilogram amounts to SEK 173/kg, SEK 284/kg, and SEK 438/kg respectively.

It is assumed that approximately 48,030 tonnes of herring can be caught for human consumption in 2035 in line with the precautionary principle and healthy stock growth. I further assume that equal shares of this herring are processed into fried, smoked, and fermented herring (16,010 tonnes each). Taking into account the indexed prices per kilogram of processed products using CPIF, the total value added would amount to SEK 14,328,950,000 in 2035.

Fishing category and species	Value added per kilogram of fish in 2035 (SEK)	Total value added in 2035 for 16,010 tonnes (SEK)
1 kg of herring processed into fried herring via producer and retailer	173	2,769,730,000
1 kg of herring processed into fermented herring via producer and retailer	438	7,012,380,000
1kg of herring processed into smoked herring via producer and retailer	284	4,546,840,000

Table 13. Potential value added from processed herring for three different products within the framework of fishing under the precautionary principle, with a human consumption quota of approximately 48,030 tonnes

4.1.2 Cod as Food – Contribution to the Swedish Economy in Terms of Socio-Economic Value in 2035

The total value of Swedish Baltic Sea fisheries for human consumption in 2035 will, according to the precautionary scenario, also include a Swedish cod quota of 31,600 tonnes. A calculation of the total value added of frozen cod fillets in consumer packaging available in retail stores provides an overview of the potential socio-economic value of processing such a quota for human consumption.

The calculation is based on an indexed price of SEK 14.5–18.5/kg of cod at the first stage of the value chain to fishermen in 2022. Using an average value of SEK 16.5/kg of cod in 2022 and indexing it to 2035 using CPIF, this is estimated at SEK 20.5/kg. The fishery-related value added is therefore SEK 16.4/kg. Furthermore, proxies for producer-related value added are indexed to SEK 8.06 and SEK 5.03 respectively. The retail-related value added is defined as 90 per cent of the retail price of fish, minus the purchase price (Ekonomifakta, 2025). Here, I use a cod price of SEK 280/kg as an average of the indexed 2026 prices of SEK 190–370/kg, minus the purchase price. It is very difficult to determine the purchase price of fish sold in retail to consumers. A shortcut is to use average retail mark-ups applied to fish in the grocery sector. I assume that the wholesale purchase price is SEK 188/kg. In this case, the retail-related value added amounts to 280 × 0.9 – 188 = SEK 64/kg, which indexed to 2035 using 2 per cent annual growth (compound interest) over nine years becomes SEK 76.5/kg. In addition, a 12 per cent food VAT is added to this value added. According to my calculation, frozen cod sold in retail in 2035 will generate a total value added of SEK 160.9/kg. Multiplied by 31,600 tonnes of cod, the potential total value added from frozen cod - i.e. the contribution to socio-economic development in Sweden from this processing - amounts to approximately SEK 5,084,440,000 in 2035.

1 kg of frozen cod sold to consumers in 2035	SEK
Sale price fishermen	20.5
Fishery-related value added	16.4
Producer-related value added	
- *Wage share*	8.06
- *Capital share*	5.03
Retail-related value added	76.5
Value added tax (VAT)	33.6
Total fishery-related value added	**160.9**

Table 14. Potential value added from processed cod within the framework of fishing under the precautionary principle in 2035

To sell frozen cod on a larger scale, large-scale production is required. To estimate the investment that would be needed in Sweden to produce frozen cod fillets based on 31,600 tonnes of cod per year, investments of SEK 400–500 million would be required according to AI calculations based on the CAPEX model. Operating costs would, according to the same model, amount to approximately SEK 900 million per year. In total, 200–280 jobs would be created, including indirect jobs, where each of these jobs has the potential to contribute approximately SEK 1.20 million per year to Sweden's economy in terms of GDP on average in 2026 monetary value (Statistics Sweden, 2025a and 2025b). The total contribution in 2026 monetary value amounts to SEK 240,000,000 per year.

5. Conclusion

Approximately 70–75 per cent of Sweden's Baltic Sea catch is used for Danish feed production today, and the majority of value creation takes place outside Sweden. The value added accruing to Sweden from reduction fisheries is very low (approximately SEK 4/kg). There is very substantial potential to generate significantly higher socio-economic value by increasing, in line with a precautionary principle, the share of the herring quota that is landed and processed in Sweden. A precautionary scenario implies recovered fish stocks and could increase value creation by up to approximately SEK 3 billion annually already at current quota levels. In the longer term (2035), with recovered stocks, processed herring for human consumption could generate approximately SEK 14 billion per year in total value added, and cod could contribute approximately SEK 5 billion per year. This results in a total potential socio-economic effect of approximately SEK 19 billion per year. According to this report, this socio-economic potential - arising from increasing herring fishing for human consumption in the Baltic Sea and rebuilding processing capacity along the Baltic coast - would strengthen Sweden's GDP and regional development, create employment in coastal communities, and increase Sweden's food security.

BalticWaters is an independent foundation with a single goal: to keep our sea alive. The foundation carries out environmental projects and conducts applied research to demonstrate which measures can contribute to a healthier Baltic Sea and resilient fish stocks. BalticWaters also works to develop and disseminate knowledge about the sea to the public, authorities, and decision-makers. The aim is to increase understanding of the challenges facing the marine environment and to build public support so that decisions are taken and measures implemented.

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