

**Evaluation of effects of management options
for the recreational cod fishery in the western Baltic Sea**

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Disclaimer:

The evaluation of the effects of management measures for recreational fishing on the Western Baltic cod catch presented here is based on the only available long-term data set on recreational fishing on this specific stock. It comprises German data only, collected since 2004. The input data has been peer reviewed and is included in the ICES stock assessment since 2013. The analysis of management effects for 2017, however, has been conducted on short notice to allow for the inclusion in the EU fisheries council negotiations in October 2016. This analysis is therefore not yet published in the scientific literature and thus only internally reviewed. The Thünen Institute plans to publish the analysis within the next few months, to follow good scientific practice.

Introduction: Significance of recreational fishing

Marine recreational fishing is a popular leisure activity in Europe and an integral part of European coastal life and communities. According to unpublished data from the ICES Working Group on Recreational Fisheries Surveys (WGRFS), 6.3 million participants went fishing on 57 million days (mean 9.6 days per fisher and year) in the Euro-Atlantic area spending 4.9 billion Euros in 2015. This money is often spent in the coastal communities contributing to local employment such as tackle shops, hotels, restaurants, boat and equipment rentals, charter boats and fishing guides, for example. The recreational sector does not only contribute economically but also provides social benefits to society like relaxation, exercise and experience of nature. Further, recreational fishers often collaborate with scientists as citizen scientists collecting biological catch data (length, weight, tissue samples) that helps contribute to the evidence-base and thus to the sustainable management of stocks.

German marine recreational fisheries

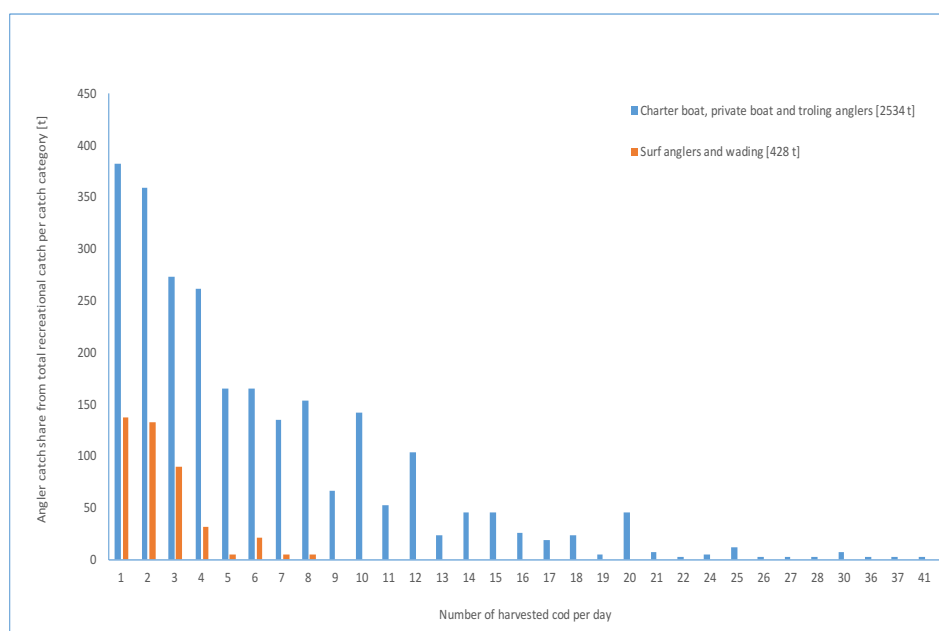
Marine recreational data collection in Germany started in 2004. In 2014, Thünen-OF carried out a nation-wide telephone survey contacting 50,000 households. As a result, it was estimated that there were 174,000 marine recreational fishers in Germany spending at least 117 million Euros annually. The total number of German anglers fishing in the Baltic Sea was estimated at around 163,000 with a total effort of approximately 1.1 million fishing days annually. The effort is almost evenly split between land-based (surf fishing and wading) and sea-based (charter boat, private boat and trolling) fishing methods, whereby 85% of cod catches are from sea-based fishing activities. (2)

German cod catches by recreational fisheries are now as high as from the commercial fishery. Averaged over the last three years (2013-2015) marine recreational fishers caught 80% of the German commercial landings (Figure 1) in addition to the commercial landings. The reason for this gradual adjustment of catch rates between the recreational and commercial fishery is particular due to the declining cod quota for the commercial sector. By contrast, annual recreational catches fluctuate considerably (2). Currently, marine recreational fishers for cod are only regulated by a minimum landing size of 38 cm.

Management of recreational fishing on western Baltic cod

Against the background of the urgent need for reducing overall mortality on the western Baltic cod stock to allow for a recovery, managers are discussing potential contributions of the marine recreational sector in stock rebuilding efforts. It should be noted that the recreational fishing mortality of western Baltic cod is likely to be an underestimate, as currently only German data is included in the assessment. Thünen-OF has calculated the effect of potential management measures (bag limits, closed season) for marine recreational fishers. All calculations are based on German data and are representative of the German marine recreational sector only which is almost exclusively limited to rod and line fishing methods. For a regional perspective managers need to consider the individual Members States and the specifics of their recreational fisheries. The available marine recreational time series in Germany (2005-2015) allows us to differentiate how many cod are harvested by how many anglers and how high the recreational removals are per individual catch category (Figure 1). The distribution of anglers per catch category and the related distribution of recreational cod harvest per catch category varies considerably between years. In addition, this data enables us to evaluate the proportion of affected marine recreational fishers and the potential reduction of recreational cod harvest by the introduction of a bag limit.

Figure 1: Proportion of German angler cod harvest per catch category from the total German recreational cod harvest in 2015 [t].

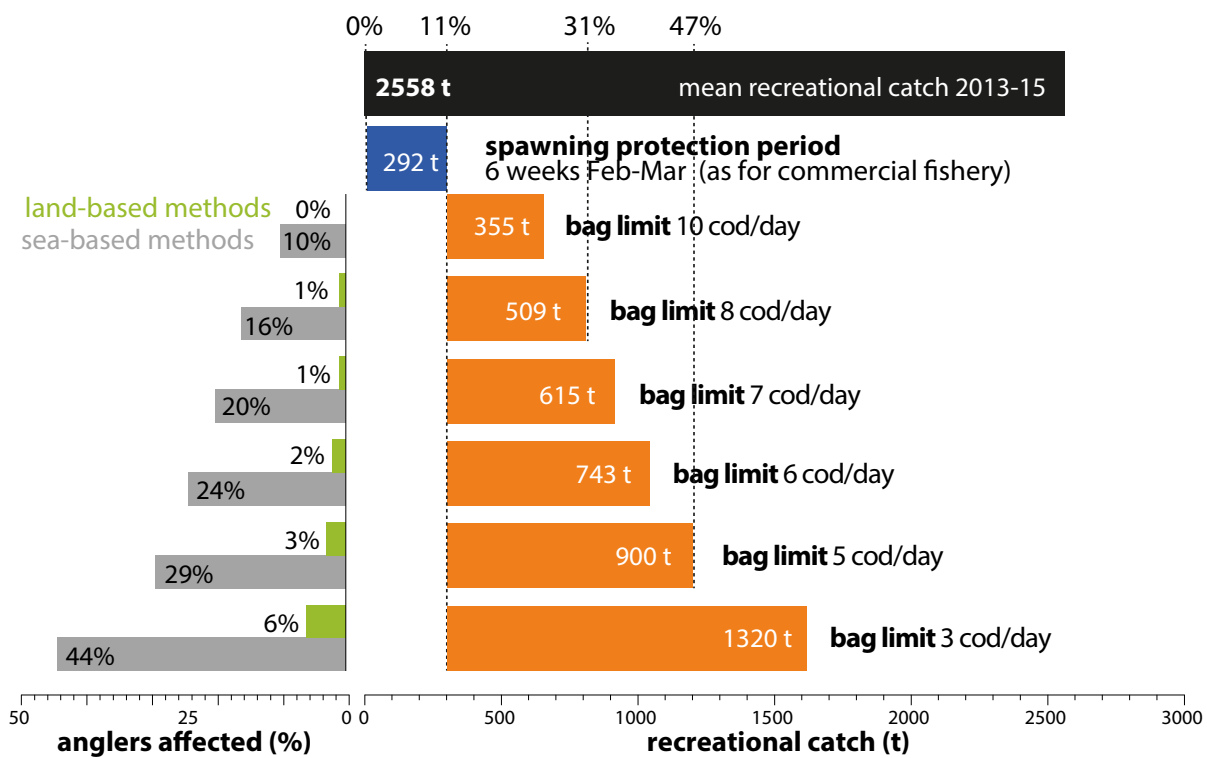


Spawning closures

The introduction of a spawning closure for Baltic cod – similar to that of the commercial fishery, currently (2016) from February to Mid-March – for the recreational fishery would lead to effort and thus catch reductions. Furthermore, it contributes to sharing the burden of stock rebuilding efforts between the commercial and the recreational sector allowing for more equitable management. Thünen-OF evaluates the acceptance of a closed season by the German recreational fishing community as high (79% of interviewed anglers (n=448), and angling federations support such a measure). In general, anglers are familiar with a variety of closed

seasons for recreational target species. Unlike in the commercial fishery recreational fishers are still allowed to fish but would need to release their entire catch for those species restrictions apply for. A closed season for Baltic cod as described above lead to an **average reduction of 292 t** (Figure 2) for the reference years 2013-2015. Depending on weather conditions, the effect of a closed period varies considerably between reference years, since fishing activity in cold and stormy winters is low. Independent of the introduction of a closed period the majority of German charter boats already adhere to a voluntary self-commitment to protect spawning aggregations of cod in the western Baltic Sea. Charter boat operators object to spawning closures and argue that such a measure would seriously obstruct their business.

Figure 2: Mean annual recreational harvest reductions for a spawning closure from February to Mid-March, and different bag limits including the percentage of affected anglers by the latter (sea-based & land-based methods) for the reference years 2013-2015.



Bag limit

The effect of daily bag limits on marine recreational fishers varies considerably between different reference years. Depending on the bag limit the majority of affected marine recreational fishers are private boat and charter boat anglers, because land-based anglers have relatively low cod harvest rates (Figure 1, 2). Table 1 gives an overview of the effects of daily bag limits on the potential reduction of recreational harvest and the percent of affected anglers for bag limits of 3,

5, 6, 7, 8 and 10 cod per angler and day. The mean harvest reduction of a certain bag limit refers to the respective total annual harvest of the German recreational cod fishery in the Baltic Sea.

Thünen-OF perceives increased release rates due to bag limits as uncritical, since post release survival of recreational caught and released Baltic cod is nearly 90% (3), indicating that fisheries management and conservation objectives are supported and recreational fisheries releases are reconcilable with the CFP.

The acceptance of a bag limit by recreational fishers is much lower than that of other measures (48% of interviewed anglers, n=448). German angler federations stated that they would not support the introduction of bag limits, while this is the preferred measure of German charter boat operators. On average, only 4.7 cod per charter boat angler and day were harvested in 2015. Restrictive bag limits may prevent anglers from going fishing with unknown economic effects on the charter boat fishery and the for-hire sector.

Other measures

Further management measures, such as an increase of the minimum landing size (MLS) for specific métiers, have been evaluated and could lead to further reductions (e.g. increase of MLS from 38 cm to 45 cm would decrease the harvest by about 655 t). Such a measure would be well accepted by the German angling federations and recreational fishery (82% of interviewed anglers, n=448) but is objected by charter boat operators. This rule is however difficult to implement, as it should only apply to métiers where survival rate of released cod is high (sea-based angling), but not for land-based angling and commercial gear. Also, changes in the Minimum Conservation Reference Size (MCRS) would affect the technical regulations and thus require the approval of the European Parliament. It appears unlikely that such a change could be implemented in time for the 2017 season.

Table 1: Annual harvest reduction and affected anglers in percent (sea-based & land-based methods) for the reference years 2013-2015 and for the average of the data for the last three years.

Year	Bag limit = 3			Bag limit = 5			Bag limit = 6			Bag limit = 7			Bag limit = 8			Bag limit = 10		
	Harvest reduction (%)	Affected anglers (sea) (%)	Affected anglers (land) (%)	Harvest reduction (%)	Affected anglers (sea) (%)	Affected anglers (land) (%)	Harvest reduction (%)	Affected anglers (sea) (%)	Affected anglers (land) (%)	Harvest reduction (%)	Affected anglers (sea) (%)	Affected anglers (land) (%)	Harvest reduction (%)	Affected anglers (sea) (%)	Affected anglers (land) (%)	Harvest reduction (%)	Affected anglers (sea) (%)	Affected anglers (land) (%)
2013	37	36	4	30	23	2	24	18	1	18	14	1	14	11	1	6	6	
2014	44	47	6	38	30	3	33	25	3	28	20	2	24	16	2	14	11	1
2015	47	49	7	35	35	3	29	30	1	25	25	1	20	21		13	14	
Mean	43 (1320 t)	44	6	35 (899 t)	29	3	29 (743 t)	24	2	24 (615 t)	20	1	19 (509)	16	1	11 (355 t)	10	

Exemplary, for a bag limit of 7 cod per day the mean harvest reduction over the last three years amounts to 615 t or 24%. In 2015, this bag limit would have affected 25% of private and charter boat anglers but only 1% of surf anglers. Similarly, in previous years mainly private and charter boat anglers were affected, since surf anglers only reached the bag limit in 2% (2014) and 1% (2013) of cases, respectively.

Concluding remarks

The introduction of a closed season together with an exemplary bag limit of 5 cod per day and angler has the potential to reduce German marine recreational removals of western Baltic cod by 47% or 1192 t, based on the average of 2013-15.

Our calculations of potential harvest reductions have the following limitations:

- we were unable to calculate the effect of overlapping measures: The sum of two measures implemented is certainly smaller than the two measures independently.
- the realized reduction in recreational catch in 2017 may largely depend on the availability and catchability of cod and weather conditions in this specific year.
- the introduction of any recreational fishing regulation will likely result in compensatory effects, such as an increase in effort outside the spawning closure, or the sharing of catch among anglers on one specific vessel.

In general, recreational fishing dynamics are different from those of the commercial sector and it is not well understood how the Baltic recreational fishery will adhere to new regulations. Management measures that imply very large annual reductions of recreational fishing mortality should make sure not to jeopardize the social and economic sustainability of the recreational sector at large.

Literature

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