



Incentivising selective fishing under a policy to ban discards; lessons from European and global fisheries



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ABSTRACT

The reduction of discards in European fisheries has been identified as a specific objective of the reform of the EU Common Fisheries Policy. To reduce the uncertainty in catch data and the socially unacceptable waste of resources that results from the disposal of catch at sea, a policy to ban discards has been proposed. Discard bans are currently implemented in Alaska, British Columbia, New Zealand, the Faroe Islands, Norway and Iceland. Experience from these countries highlights that a policy of mandatory landings can result in a reduction in discards, but relies upon a high level of surveillance or economic incentives to encourage fishers to land more of their catch. Discard bans will also not result in long term benefits to stocks unless total removals are reduced, through the avoidance of undersized, non-commercial or over quota catch. Experience shows that additional management measures are required to incentivise such a move towards more selective fishing. Success has resulted from the use of area closures and bycatch limits, with potential applications in EU fisheries. However, selective fishing will not be a panacea for the current state of European fisheries; discard bans and accompanying measures must be embedded in a wider management system that constrains fishing mortality to reasonable levels before sustainable exploitation can occur.

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1. Introduction

Discarding, where a portion of a vessel's catch is returned to the sea dead or alive [1], is a widespread problem in EU fisheries. 40–60% of catch is discarded by North Sea beam trawlers, whilst discard rates of 30% are estimated for bottom trawlers in the Northeast Atlantic [2]. The incentives for discarding are numerous, but result from multiple species and size of fish occurring in the same area and being captured by fishing gear of limited selectivity [3]. In EU fisheries, regulations define the catch that can be legally landed. Fish that exceed quota, are below minimum landing size (MLS) or do not meet catch composition regulations cannot be retained and must be discarded [4]. Catch will also be discarded if it is of poor quality, small size, or of a non-commercial species resulting in a low market value [5]. Disposal at sea results in much of this catch being undocumented, introducing additional uncertainty into the stock assessments of commercial species and making it more difficult to determine appropriate fishing mortality levels [3]. Consequently, the reduction of discards in European fisheries has been identified as a specific objective of the proposed reform of the Common Fisheries Policy (CFP) [6]. To facilitate this

aim, the implementation of a discard ban in combination with catch quotas has been proposed [7]. Dependent upon the level of compliance a discard ban should result in a reduction in discards. However this will only benefit stocks in the long term if a reduction in total removals and therefore fishing mortality is achieved [3]. In the case of commercial species, reducing the fishing mortality of juvenile fish would allow a greater number of individuals to survive and reproduce [8], with a subsequent growth in the size of stocks and exploitable catch [9]. However, experience shows that in the absence of incentives to fish more selectively and avoid the capture of formerly discarded catch, a discard ban will not result in more sustainable fisheries [10]. Discard bans have been implemented in a number of fisheries around the world, including the US Alaskan and British Columbian groundfish trawl fisheries, and in New Zealand, Icelandic, Norwegian and the Faroese fisheries. This paper briefly assesses the effect of these discard bans and the surrounding management system, identifying whether any benefits of the policy have been observed, primarily through the reduction of discards and incentivising of more selective fishing through the avoidance of undersized, over quota and non-target species. The experience from UK fisheries projects and pilot schemes in incentivising a behaviour change in fishers is also evaluated. Finally, conclusions are drawn from both sets of observations to provide a number of lessons that can be used by UK fisheries managers when implementing the new discards policy under a reformed CFP.

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2. Incentives for selective fishing under a discard ban – lessons from abroad

2.1. US Alaskan groundfish fisheries

The US Alaskan groundfish fishery has operated a discard ban for Pacific cod (*Gadus macrocephalus*) and pollock (*Theragra chalcogramma*) since 1998 [11], supported by one of the most comprehensive observer programs in the world [12]. Commercial species are managed through Individual Vessel Quotas (IVQs) or fishing cooperatives, placing constraints on the capacity of the fishery [8]. Non-target species are protected through fishery specific bycatch levels [11]. Those that are vulnerable or commercially important, including herring (*Clupea pallasii*), halibut (*Hippoglossus stenolepis*), salmonids (*Oncorhynchus spp*) and commercial species of crab (*Paralithodes camtschaticus*, *Chionoecetes opilio*, *Chionoecetes bairdi*) [13] are defined as Prohibited Species. Exceeding the proscribed bycatch levels will trigger area or fishery closures [11,14,15].

Since the discard ban was implemented, the discard rates of the Alaskan walleye pollock pelagic trawl fishery have fallen. Pacific cod discard rates fell from 6.8% to 0.4% by 2003, and pollock discard rates are less than 1% [11]. Changes in the selectivity of fishing have also been observed in response to bycatch limits. A voluntary change to more selective pelagic trawls occurred in the walleye pollock fishery in response to high catch rates of prohibited crab and halibut. Pelagic trawls are now mandatory and levels of bycatch are less than 2% [11]. The selectivity of fishing has also been improved in the demersal longline fishery after a voluntary fleet wide communication programme designed to reduce the incidental capture of halibut was implemented [15]. Observer catch and bycatch data are collated by the Fisheries Information Services and the locations of bycatch hotspots, along with advice on bycatch reduction techniques, are reported to vessels within the programme. As a result fishing effort has redistributed away from areas associated with increased bycatch and the bycatch rates of participating vessels are 30% lower than the rest of the fleet. Gilman et al. [15] argued that the programme has contributed to a 33% reduction in the levels of halibut bycatch.

The introduction of IVQs has reduced the capacity of the sablefish (*Anoplopoma fimbria*) and halibut longline fishery. With fewer vessels operating, fishing grounds are less crowded allowing the remaining effort to concentrate in more productive areas where the abundance of juvenile fish is lower. Improved choice of fishing grounds resulted in a 9% increase in proportion of mature female sablefish in the catch, leading to a 9% increase in the spawning biomass per recruit by 2001 [8].

The use of a discard ban in the Alaskan groundfish fishery has reduced discard levels of the designated species [11]. Placing limits on bycatch that will constrain fishing have incentivised more selective fishing, with a shift in fishing grounds and gear choice, and increased fleet communication [8,11,15]. This has been aided through a high level of observer coverage and allocation of individual quotas. Under this management system, in which the discard ban is embedded, no groundfish stocks are considered to be overfished with only 3 stocks falling below target biomass levels [16].

2.2. British Columbia groundfish trawl fishery

The discarding of rockfish (*Sebastes*) species is prohibited in the British Columbia groundfish trawl fishery. Only those species designated as Prohibited Species, which cannot be legally retained, are excluded from the ban and mitigation measures are required to maximise their survival rates [17]. The fishery is managed under an Individual Transferable Quota (ITQ) system supported by 100%

observer coverage. When a species quota is exhausted, fishers must stop operating in that area, or purchase additional quota within defined limits [18,19]. Overages of up to 37.5% for halibut and 15% for hake (*Merluccius productus*) can be legally landed without the purchase of additional quota, reducing the incentive to discard. This overrun is subtracted from the following year's quota and the value of the catch is forfeited. This removes any incentive to target over quota catch that can be legally landed, whilst encouraging fishers to match catches to available quota [17,20]. Marketable discarded catch is counted against quotas, after allowing for estimated discard survival rates, discouraging highgrading where fishers try to maximise profits by landing only the larger more valuable individuals [18,19]. Non-target and non-quota species are managed through bycatch limits [18,20].

The direct effect of the discard ban in promoting more selective fishing has not been evaluated in the literature. Reductions in the discards of Pacific ocean perch (*Sebastes alutus*), yellowmouth (*Sebastes reedi*), redstripe rockfish (*Sebastes proriger*), and short-spine thornyheads (*Sebastolobus alascanus*) have been observed, but are linked to constraining quotas and the accounting of discard mortality by onboard observers [18]. Targeting of species with less constraining quotas has been observed, with fishers avoiding areas where fish with limited quota are more abundant; in the case of rougheye (*Sebastes aleutianus*), yelloweye (*Sebastes ruberrimus*) and shortraker rockfish (*Sebastes borealis*) this has resulted in a 50% reduction in catches [19]. Bycatch limits have also triggered more selective fishing. Discard rates of spiny dogfish dropped by 5% between 1997 and 2004, and the annual bycatch mortality of halibut has been reduced by 15% [18].

More selective fishing has been incentivised, but the role of the discard ban in this change is unclear. Constraining bycatch limits and a reduction in the benefits of discarding, facilitated through a full observer programme, have encouraged fishers to match catches to available quota and avoid excessive bycatch [18,19]. Under this system of management the majority of groundfish stocks are considered to be in a healthy condition, however not all stocks are being adequately protected [21].

2.3. Faroe Island fisheries

The Faroese Islands have operated under a full discard ban since 1994 [22]. Ninety percent of the Faroese fishing fleets are managed under effort controls [23], whilst larger vessels operating in deeper waters are managed under quotas and bycatch limits for cod and haddock [24,25]. Trawling is prohibited inside the 12 nautical mile limit [26,27], except for a limited number of small trawlers targeting plaice (*Pleuronectes platessa*) and lemon sole (*Microstomus kitt*) during summer months [23,24]. Fishers operating in this area are obliged to report high catches of undersized fish [23,28]; if juveniles of cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) or saithe (*Pollachius virens*) contribute more than 30% of the catch, an area closure will be implemented [23,24,27]. Fishers must also vacate fishing grounds if 4% or more of the total trip catch of cod is below 40 cm [22]. Outside the 12 nautical mile limit, the mandatory use of large minimum mesh sizes and sorting grids in trawls is thought to reduce the capture of undersized fish [23].

Discarding in the demersal fisheries targeting Faroe Plateau cod, saithe and haddock is thought to be low [29]. These fisheries are managed through effort controls which do not generate incentives for discarding as fish are not counted against quotas [23,28]. High grading may be incentivised in the fisheries managed under TACs, but has not been quantified [20]. No discard data are currently available to evaluate the efficacy of the discard ban [23]. However it is known that the ban is not always enforced and some discarding does occur [25]. Information on changes in

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