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Evaluating seafood eco-labeling as a mechanism to reduce collateral impacts of fisheries in an ecosystem-based fisheries management context

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ABSTRACT

By considering not only target species catch but also bycatch of non-target species and habitat damage, ecosystem-based fisheries management (EBFM) has the potential to minimize the environmental impact of fisheries. Defining and benchmarking EBFM strategies for these incidental environmental impacts has been challenging, and this lack of consensus has, in part, resulted in a proliferation of eco-labeling schemes with variable and vague criteria for environmental targets. The performance of fisheries certified by the Marine Stewardship Council (MSC), the most prominent eco-labeling certifier, was compared to non-certified fisheries and evaluated against target reference points for a suite of metrics derived from the EBFM literature. Specifically we compared marine mammal bycatch, finfish discard rates, and gear impacts between MSC-certified fisheries and non-certified fisheries. Discards of non-target finfish and bycatch rates of marine mammals were no different between certified and non-certified U.S. fisheries. Observer coverage was no higher in certified fisheries, and many fisheries failed to meet the coverage level thought adequate to document bycatch of protected species. MSC-certified fisheries did have lower average gear destructiveness scores than non-certified stocks when weighted by landings but not when weighted by the number of fisheries. Our analysis indicates that MSC-certified fisheries perform better on some ecosystem-based sustainability metrics but are indistinguishable from non-certified stocks on others, and improvement is needed for all certified fisheries to meet quantitative goals for the collateral impacts of fishing.

1. Introduction

Marine fisheries support the livelihoods of over 38.5 million people and represent 16.6% of global animal protein intake [1]. At the same time, 30% of fisheries are considered overexploited, and the number of over-exploited stocks is increasing [1]. Wild capture production of seafood has leveled off in recent decades [1], and the increasing demand for seafood of a growing human population will likely lead to increased pressure on stocks already harvested at or near their limits. To prevent future fisheries collapse and ensure food security, there has been a growing call to reform marine fisheries management based on scientific, policy and market-based approaches [2–5].

Many of these approaches have focused on stock-specific outcomes. Conventional stock assessments rely on catch, effort and surveyed abundances in order to estimate current stock biomass, and compare this estimate to predefined trigger points [6,7]: the limit reference point, and the target reference point (UN Convention on the Law of the Sea [8], UN Fish Stocks Agreement [9]). Typically, catch is reduced when the stock abundance drops below the target, and is prohibited when it reaches the limit reference point [10]. Traditionally, trigger points have applied only to the target stock, reflecting both the broader priorities of the management agencies and the availability of information.

Despite the historical focus on single stock metrics of

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sustainability, there is a growing recognition that fishing, which exists within the context of a complex ecosystem, has far reaching consequences [11]. Ecosystem Based Fisheries Management (EBFM) puts greater emphasis on comprehensive ecosystem health [11–14] and calls for the avoidance of ecosystem and habitat degradation, reductions in incidental mortality of non-target species (i.e. bycatch), as well as the maintenance of ecological community composition. In principle, EBFM should lead to the integration of wider ecosystem considerations into the aforementioned trigger points. In this regard, EBFM ideals have begun to be incorporated into US fisheries policy, especially with respect to bycatch (Magnuson Stevens Fishery Conservation and Management Act (MSA), Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA)). However, enacting EBFM presents considerable difficulties due to the challenge of quantifying ecosystem impacts, as well as conflict between EBFM objectives. While government policies mandating ecosystem-based management are increasing (e.g. U.S. National Ocean Policy), many EBFM principles have yet to be integrated into fisheries management as scientifically implementable targets.

Consumer awareness of fishing's wider ecosystem impacts has outpaced the development of quantitative EBFM metrics, resulting in the proliferation of seafood grading schemes [15] that attempt to capture EBFM goals via qualitative criteria. While a holistic grading scheme to evaluate sustainability in terms of not only the harvested species but also its collateral impacts has the potential to provide a more comprehensive view of the cumulative impacts of fishing, the absence of concrete metrics with which to measure the incidental impacts of fishing has obscured the already vague notion of EBFM [16].

Here the collateral impacts of fisheries certified by the largest and most prominent seafood eco-labeling program, the Marine Stewardship Council (MSC) were compared to non-certified fisheries. The MSC recognizes seafood sourced in a manner consistent with their criteria, providing a mechanism by which demand for sustainability can incentivize stewardship [17–19]. To attain certification, fisheries must meet criteria in three equally weighted categories, namely 1) target stock health 2) ecosystem health and 3) management agency responsiveness. A fishery can be certified even if they do not meet all of these criteria provided they agree to enact pre-specified changes within a specific time frame. Two recent studies showed that MSC-certified fisheries on average met their stock-specific management targets more often than non-certified fisheries [20,21], though some fisheries classified as overfished were certified, and MSC has been criticized for allowing fisheries to maintain certification despite declines in target stock biomass [16]. Fishery performance on ecosystem metrics has been harder to assess [22,23]. In the era of “dolphin-safe” tuna labels the modern consumer likely defines “sustainable” seafood as products sourced in a manner that limits negative ecosystem impacts [24]. Like much of the EBFM literature regarding collateral impacts of fishing, the MSC's vague definition, which requires that fishing practices “allow for the maintenance of the structure, productivity, function and diversity of the ecosystem”, is both subjective and difficult to implement [22]. This subjectivity has led to inconsistent application of certification requirements [22,25]. To address this and other stakeholder concerns, MSC is currently reviewing its standards and drafting new certification criteria with assistance from a panel of experts [26]. The MSC therefore has the opportunity to make its ecological criteria both more concrete and reflective of EBFM ideals.

EBFM implementation has been impeded by a lack of quantitative metrics and reference points for collateral impacts with which to grade performance [27,28]. Evaluating EBFM performance has been further limited by the lack of data on fisheries-specific impacts. Three metrics were constructed that encapsulate key components of the collateral impacts of fisheries in an EBFM context and also have quantitative data available. The ability of currently certified fisheries to meet literature-based reference points was compared against non-certified fisheries. Specifically 1) marine mammal bycatch rates, 2) finfish discard ratios, and 3) gear impacts of MSC-certified fisheries were compared to with those of non-certified fisheries to evaluate whether MSC-certified fisheries do represent “the best environmental choice in seafood,” as the MSC tagline claims [25]. The objective of this analysis is to provide information consumers can use to evaluate the environmental impact of currently certified seafood relative to seafood alternatives, and to compare performance of these fisheries relative to quantitative metrics of ecosystem-based sustainability.

1.1. Rationale for metrics of collateral impacts chosen

Bycatch is defined as the unintentional capture of living marine resources that are harvested by a fishery and discarded dead. Incorporating fishing impacts on non-target species, or bycatch, is a universal tenet of EBFM [14,29]. It represents two of the five Ecosystem Impacts for which fisheries are evaluated. Certified fisheries must ensure that bycatch levels do not pose a risk of serious harm to their populations, and monitoring is adequate to estimate impacts on bycatch species [30]. No quantitative targets of adequate observer coverage nor quantitative metrics for serious harm are given within the certification guidelines, however. Instead, bycatch must be within “biologically-based limits”, which are defined as those that avoid serious harm. For Endangered, Threatened or Protected (ETP) species, the fishery must also meet national and international requirements for protection of these species, if they are established. Given these explicit requirements for bycatch of protected species like marine mammals, certified fisheries were expected to meet these targets as well as perform better than non-certified fisheries on marine mammal bycatch.

Fishery performance was also evaluated on a second component of bycatch: overall finfish discard rates. The discarding of fish at sea is widely regarded as a waste of fish resources [31], a threat to the long-term sustainability of fisheries and maintenance of biodiversity [32], and a serious impediment to the management and rebuilding of stocks [33]. Given these wide-ranging negative effects, discards have been deemed inconsistent with the FAO Code of Conduct for Responsible Fisheries [34]. The overall discard rate by a fishery has been widely used to evaluate the ecological sustainability of fisheries [31,35,36]. However, the current MSC certification scheme only considers whether discards negatively affect the sustainability of those species that are discarded, and not the overall discard rate relative to catch and its more wide-ranging ecological and social consequences. As public opinion rallies around minimizing discard rates or banning discards entirely, as was done recently in Europe [37], consumers may expect eco-labeled fisheries to meet discard rate limits considered sustainable. The quantitative scoring scheme developed by Pitcher et al. [38] was used to evaluate whether discard rates comply with the FAO Code of Conduct by scoring fisheries with a discard rate of $\leq 15\%$ of the total catch as “good” [39]. Because discard rates are not taken into account within the MSC certification process, certified fisheries were not expected to outperform non-certified fisheries or meet this literature-based target, unless achieving sustainability on some ecosystem metrics indirectly leads to improved performance on other metrics of collateral impacts.