Brief Communication

Steering toward sustainability: Proposed Minimum Legal Size for 50 marine species

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The marine fisheries sector in Gujarat is undergoing rapid advancements, with notable improvements in fishing technology, expansion into new fishing grounds, and targeting of previously untapped resources. The industry is primarily led by a mechanized fleet—trawlers at the forefront—followed by dolnetters, gillnetters, and motorized fleets (both inboard and outboard). However, declining catch rates of commercially valuable fish species have pushed fishermen to harvest smaller-sized fish, posing a serious threat to the long-term sustainability of fish stocks. One effective tool to combat growth overfishing is the implementation of minimum legal size (MLS) regulations. MLS helps reduce juvenile exploitation, protects reproductive groups, and enables fish to grow, ultimately improving market value. The criteria for determining MLS in Gujarat are based on the methodology of Mohamed *et al.* (2014) (Table 1), focusing on the species' growth, biological, and reproductive traits. For resilient stocks, the minimum size at maturity (MSM) is proposed to combat growth overfishing, while the size at first maturity (LM_{50}/WM_{50}) is applied to depleted or rebuilding stocks, ensuring fish have a chance to spawn before being caught, thus reducing recruitment overfishing.

Based on an elaborate study and primary data collected by the research team of Veraval Research Station of ICAR-CMFRI, a minimum legal size for 50 commercially important resources were proposed to combat the overfishing in the region. The criteria for determining Minimum Legal Size (MLS) were based on several key factors, including time-series moving average trends, species growth or condition, exploitation rates, and reproductive strategies. For commercially exploited species such as *T. lepturus, N. japonicus, P. layardi, E. affinis, M. cordyla, C. hippurus, O. biauritus, P. diacanthus*, and *J. glaucus*, the Minimum Size at Maturity (MSM) was selected as the MLS benchmark. In contrast, the size at first maturity (LM_{50}) was used as the MLS criterion for species like *S. laticaudus, P. candidus*, and various shellfishes including *S. crassicornis, P. stylifera, M. affinis, P. semisulcatus,* and *U. duvaucelii*. A detailed breakdown of the MLS for these commercially significant species in the region can be found in Table 2.

Table 1. Decision Logic criteria used to define the MLS for marine fish stocks (adopted from Mohamed *et al.,* 2014).

Criteria	Explanation	Logic
SSD	Size at sexual differentiation into male and female	This metric can be applied to prevent juvenile exploitation and mitigate growth overfishing in stocks that exhibit high abundance, strong reproductive capacity, and demonstrate resilience to intense fishing pressure without significant reductions in biomass.
MSM	Minimum size at maturity or size of the smallest mature fish	This metric can be utilized to prevent growth overfishing in stocks that exhibit moderate resilience to fishing pressure.
LM_{50}/WM_{50}	Length/Weight at first maturity or size at which 50% of the fishes are mature	Employed as a metric to fully prevent growth overfishing while partially mitigating recruitment overfishing, this approach is applicable in scenarios where the stock is either depleted or in the process of rebuilding.
SCM	Size at complete maturity or size at which 100% of the fish are mature	This metric can be employed to prevent recruitment overfishing by setting a maximum legal size for capture. It is particularly relevant for fish species that attain large sizes and exhibit slow growth rates, with seasonal applicability.

Table 2. Minimum Legal Size (MLS) of 45 commercially important marine resources along Gujarat coast.

Species Name	Common Name	Vernacular Name	Recommended MLS (mm/g)	Decision Logic
Rastrelliger kanagurta	Indian Mackerel	Malabar Bhangda	140 TL	MSM
Harpodon nehereus	Bombay duck	Bhumla	185 TL	MSM
Coilia dussumieri	Golden anchovy	Mandeli	115 TL	MSM
Euthynnus affinis	Little tuna	Gedra	377 TL	MSM
Megalaspis cordyla	Horse mackerel	Bhangda	261 TL	MSM
Trichiurus lepturus	Ribbonfish	Baga	448 TL	MSM
Thunnus tonggol	Longtail tuna	Sherva	480 TL	MSM
Thunnus albacares	Yellowfin tuna	Veer gedra	500 FL	MSM
Katsuwonus pelamis	Skipjack tuna	Nani gedra	350 FL	MSM
Coryphaena hippurus	Dolphin fish	Apnus	545 TL	MSM
Scomberomorus commerson	King seer	Surmai	500 FL	MSM
Scomberomorus guttatus	Spotted seer	Surmai	370 FL	LM_{50}
Rachycentron canadum	King fish	Sakra	610 FL	LM_{50}
Decapterus russelli	Indian scad	Pira bhangda	110 TL	MSM
Nemipterus japonicus	Threadfin bream (yellow)	Ranimachla	125 TL	MSM
Nemipterus randalli	Threadfin bream (red)	Ranimachla	100 TL	MSM
Lactarius lactarius	White fish	Katali	100 TL	MSM
Saurida tumbil	Greater lizardfish	Bhungar	170 TL	MSM
Saurida undosquamis	Brushtooth Lizardfish	Bhungar	100 TL	MSM
Protonibea diacanthus	Black spotted croaker	Ghol	700 TL	MSM
Otolithoides biauritus	Bronze croaker	Koth	660 TL	MSM
Otolithes cuvieri	Lesser tiger toothed croaker	Dhoma	160TL	MSM
Otolithes ruber	Tiger toothed croaker	Dhoma	170 TL	MSM
Johnius glaucus	Pale spotfin croaker	Dhoma	148 TL	MSM
Johnius dussumieri	Sin croaker	Dhoma	110 TL	MSM
Pampus candidus	Silver pomfret	Vichudo/Paplet	133 SL	MSM
Parastromateus niger	Black pomfret	Halvo	170 TL	MSM
Epinephelus diacanthus	Spiny cheek grouper	Whekli	180 TL	MSM
Priacanthus hamrur	Bull's eye	Dorali	140 TL	MSM
Cynoglossus macrostomus	Malabar sole	Jib	90 TL	MSM
Plicofollis layardi	Thinspine sea catfish	Khagi	291 TL	MSM

Species Name	Common Name	Vernacular Name	Recommended MLS (mm/g)	Decision Logic
Leptomelanosoma indicum	Indian threadfin	Dara	530 FL	MSM
Pomadasys argenteus	Silver grunt	Karkara	250 TL	MSM

Species Name	Common Name	Vernacular Name	Recommended MLS (mm/g)	Decision Logic
Congresox talabonoides	Indian Pike conger	Wam	950 TL	MSM
Scoliodon laticaudus	Spadenose shark	Sandho	376 TL	LM_{50}
Brevitrygon imbricata	Scaly whipray	Warkhol patari	140 DW	MSM
Solenocera crassicornis	Coastal mud-prawn	Lal kolmi	63 TL	MSM
Parapenaeopsis stylifera	Kiddi prawn	Kolmi	65 TL	MSM
Metapenaeus affinis	Jinga prawn	Medium jinga	102 TL	MSM
Metapenaeus monoceros	Speckled prawn	Kapsi jinga	105 TL	MSM
Metapenaeus dobsoni	Flower tail prawn	Flower jinga	60 TL	MSM
Penaeus semisulcatus	Green tiger prawn	Patta jumbo	120 TL	MSM
Portunus sanguinolentus	Spotted crab	Karchala	74 CW	MSM
Portunus pelagicus	Blue crab	Karchala	90 CW	MSM
Charybdis feriata	Cross crab	Karchala	66 CW	MSM
Panulirus polyphagus	Mud spiny lobster	Teetan	300 g	WM_{50}
Panulirus homarus	Scalloped spiny lobster	Teetan	200 g	WM_{50}
Uroteuthis (photololigo) duvaucelii	Indian squid	Narsinga	107 DML	MSM
Uroteuthis (photololigo) singhalensis	Long barrel squid	Narsinga	83 DML	MSM
Sepia pharaonis	Pharaoh cuttlefish	Makul	110 DML	MSM

Abbreviations: TL – Total Length; FL – Fork length; CW – Carapace Width of Crabs; DML – Dorsal Mantle Length of Cephalopods; DW – Disc Width of Rays; LM_{50} – Length at which 50% of the fishes are mature; MSM – Minimum Size at Maturity or size of the smallest mature fish; WM_{50} – Weight at first maturity or the weight of the animal where 50% of the fishes are mature.

The proposed MLS could be adopted by the state of Gujarat as a regulatory measure to ensure long-term sustainability of the marine fisheries of Gujarat. However, considering the multi-species and multi-gear nature of the fisheries and possible minor decline in catch rates for a few years during the initial period of its adoption could be a challenge in its adoption and implementation. A landing site or coastal district wise awareness campaigns among fishers regarding need and long-term benefits of MLS implementation prior to its adoption and implementation should allow smoother adoption and implementation. Further, the officials of implementing agency, Department of Fisheries (DoF), Gujarat should be trained in sampling and estimating the proportion of catches below MLS to ensure effective implementation during the post-adoption phase of proposed MLS. Post-adoption study on the economic impact and changes in biomass and size structure of the resources is recommended to quantify the effect of the regulatory measure as a part of management strategy evaluation (MSE). The multi-disciplinary team of ICAR-CMFRI in a participatory mode with fishers and officials of DoF should conduct awareness programs and the impact study.

References:

Mohamed, K.S. *et al*., 2014. *Mar. Fish. Infor. Serv., T & E Ser.,* 220: 3 - 7

Harvest Mela

The successful demonstration of high-value marine finfish culture in low-cost estuarine cages significantly improved livelihoods and empowered the Mavilan tribes of Kasaragod to sustain cage culture independently without financial aid. This success story highlights how targeted interventions can empower marginalized communities while ensuring sustainable development.This model of integrating aquaculture with tribal upliftment can serve as a blueprint for similar communities across India, combining economic viability with cultural preservation.