

Tutorial 4

Lecture 10

Introduction to Discards

General background to discards and discard policies - Kieran Kelleher. Discards in the world's marine fisheries. an update. FAO Fisheries Technical Paper 470, FAO, Rome, Italy, 2005

General background to discards and bycatch - Dayton L Alverson, Mark H Freeberg, Steven A Murawski, and J.G. Pope. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339, FAO, Rome, Italy, 1996

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Bycatch

Background to bycatch - Martin A Hall, Dayton L Alverson, and Kaija I Metuzals. By-catch: problems and solutions. *Marine Pollution Bulletin*, 41 (1):204–219, 2000

History of the bycatch issue - Dayton L Alverson. Some observations on the science of bycatch. *Marine Technology Society. Marine Technology Society Journal*, 33(2):6, 1999

Slippage

Portuguese case study on slippage - Yorgos Stratoudakis and Ana Marçalo. Sardine slipping during purse-seining off northern portugal. *ICES Journal of Marine Science: Journal du Conseil*, 59(6):1256–1262, 2002

Survival rates of purse seine slippage in relation to crowding in Atlantic mackerel - Irene Huse and Aud Vold. Mortality of mackerel (*scomber scombrus* l.) after pursing and slipping from a purse seine. *Fisheries Research*, 106(1): 54–59, 2010

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Undersized discards - population impacts

The relationship between mesh size and survival of discarded undersized sand whiting - Steven J Kennelly and Charles A Gray. Reducing the mortality of discarded undersize sand whiting *sillago ciliata* in an estuarine seine fishery. *Marine and Freshwater Research*, 51(8):749–753, 2000

Impact of length limits in relation to life history strategy - Lewis G Coggins, Matthew J Catalano, Micheal S Allen, William E Pine, and Carl J Walters. Effects of cryptic mortality and the hidden costs of using length limits in fishery management. *Fish and Fisheries*, 8(3):196–210, 2007

Low-value discards - population impacts

Model for determining population impacts of non-target discards -

Calculating and evaluating the mortality and in turn population issues from discarding non-target species - John G Pope, Dave S Macdonald, Niels Daan, John D Reynolds, and Simon Jennings. Gauging the impact of fishing mortality on non-target species. *ICES Journal of Marine Science: Journal du Conseil*, 57(3):689–696, 2000

Predator-prey impacts

Impact of discards on large predators - JD Stevens, Ramon Bonfil, NK Dulvy, and PA Walker. The effects of fishing on sharks, rays, and chimaeras (chondrichthyans), and the implications for marine ecosystems. *ICES Journal of Marine Science: Journal du Conseil*, 57(3):476–494, 2000

shifts in population size altering predator-prey interactions - Dayton L Alverson, Mark H Freeberg, Steven A Murawski, and J.G. Pope. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339, FAO, Rome, Italy, 1996

Energy Flow

Impact of carrion input from discards on benthic organisms - Kirsten Ramsay, Michel J Kaiser, P Geoffrey Moore, and Roger N Hughes. Consumption

of fisheries discards by benthic scavengers: utilization of energy subsidies in different marine habitats. *Journal of Animal Ecology*, pages 884–896, 1997

Impact of a discard ban on energy turnover - Francesc Sardà, Marta Coll, Johanna J Heymans, and Konstantinos I Stergiou. Overlooked impacts and challenges of the new european discard ban. *Fish and Fisheries*, 16(1):175–180, 2015

Scavengers

Scavenger consumption of discards and its ecosystem impact - Anna Boz-zano and Francisco Sardà. Fishery discard consumption rate and scavenging activity in the northwestern mediterranean sea. *ICES Journal of Marine Science: Journal du Conseil*, 59(1):15–28, 2002

Drop time and consumption of discards by scavengers - BJ Hill and TJ Wassen-berg. Fate of discards from prawn trawlers in torres strait. *Marine and Freshwater Research*, 41(1):53–64, 1990

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0.0.1 Economic Impacts

General overview - Sean Pascoe. *Bycatch management and the economics of discarding*. Number 370. Food & Agriculture Org., 1997

General overview - Rod Cappell. Economic aspects of discarding. *UK case study: discarding by North Sea Whitefish Trawlers*, Nautilus Consultants, 2001

General overview - Dayton L Alverson, Mark H Freeberg, Steven A Murawski, and J.G. Pope. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339, FAO, Rome, Italy, 1996

General overview - Ivor Clucas. A study of the options for utilization of bycatch and discards from marine capture fisheries. *FAO fisheries circular*, 928:1–59, 1997

Case study on the potential impact of the EU discard ban with examples for commercially valuable species -

Commercially Valuable Discards

Economic impact of discarding marketable catch due to regulatory requirements - Wesley S Patrick and Lee R Benaka. Estimating the economic impacts of bycatch in us commercial fisheries. *Marine Policy*, 38:470–475, 2013

Economic impact of harvesting commercially valuable juveniles - TM Najmudeen and R Sathiadhas. Economic impact of juvenile fishing in a tropical multi-gear multi-species fishery. *Fisheries Research*, 92(2):322–332, 2008

Illegal Species Discards

Impact of utilizing a tax incentive to reduce illegal discards - Lars Gårn Hansen, Frank Jensen, Urs Steiner Brandt, and Niels Vestergaard. Illegal landings: an aggregate catch self-reporting mechanism. *American Journal of Agricultural Economics*, 88(4):974–985, 2006

Potential solutions - Dayton L Alverson, Mark H Freeberg, Steven A Murawski, and J.G. Pope. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339, FAO, Rome, Italy, 1996

Low Commercial Value

Case study of potential economic impacts for EU bans - TL Catchpole, CLJ Frid, and TS Gray. Discards in north sea fisheries: causes, consequences and solutions. *Marine Policy*, 29(5):421–430, 2005

Overview of cost accrument - Dayton L Alverson, Mark H Freeberg, Steven A Murawski, and J.G. Pope. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339, FAO, Rome, Italy, 1996

Monitoring and Prevention Costs

Employment of electronic monitoring for discards including a cost evaluation - Julie Bonney, Alan Kinsolving, Katy McGauley, and Alaska Groundfish Data Bank. Continued assessment of an electronic monitoring system for quantifying at-sea halibut discards in the central gulf of alaska rockfish fishery. *Alaska Groundfish Data Bank*, 2009

General overview of observer costs - Dayton L Alverson, Mark H Freeberg, Steven A Murawski, and J.G. Pope. A global assessment of fisheries bycatch and discards. FAO Fisheries Technical Paper 339, FAO, Rome, Italy, 1996

0.1 Lecture 50

0.1.1 Regulatory History

General overview - Kieran Kelleher. Discards in the world's marine fisheries. an update. FAO Fisheries Technical Paper 470, FAO, Rome, Italy, 2005

History of the EU discard ban - Lisa Borges. The evolution of a discard policy in europe. *Fish and fisheries*, 16(3):534–540, 2015

Discard Bans

Impact of using individual quotas on spatial and temporal effort allocation and over-quota discarding in multi-species fisheries - JJ Poos, JA Bogaards, FJ Quirijns, DM Gillis, and AD Rijnsdorp. Individual quotas, fishing effort allocation, and over-quota discarding in mixed fisheries. *ICES Journal of Marine Science: Journal du Conseil*, 67(2):323–333, 2010

Case studies to show what's needed for a discard ban to be effective - HM Condie, A Grant, and TL Catchpole. Incentivising selective fishing under a policy to ban discards; lessons from european and global fisheries. *Marine Policy*, 45:287–292, 2014

Generic Fishery Regulations

Effectiveness of several regulations at reducing discards explored through case studies - Norman Graham, Richard ST Ferro, William A Karp, and

Philip MacMullen. Fishing practice, gear design, and the ecosystem approach—three case studies demonstrating the effect of management strategy on gear selectivity and discards. *ICES Journal of Marine Science: Journal du Conseil*, 64(4):744–750, 2007

Use of closures by Norway to reduce discards - Peter Gullestad, Geir Blom, Gunnstein Bakke, and Bjarte Bogstad. The “discard ban package”: Experiences in efforts to improve the exploitation patterns in norwegian fisheries. *Marine Policy*, 54:1–9, 2015

Potential generic fisheries regulations developed around MSY - Rainer Froese, Trevor A Branch, Alexander Proelß, Martin Quaas, Keith Sainsbury, and Christopher Zimmermann. Generic harvest control rules for european fisheries. *Fish and fisheries*, 12(3):340–351, 2011

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Economic impact of discard bans

Outline of when rules of followed including economic impact - Jesper Raakjær Nielsen and Christoph Mathiesen. Important factors influencing rule compliance in fisheries lessons from denmark. *Marine Policy*, 27(5):409–416, 2003

Bio-economic analysis of implementing by-catch reduces - Adriana Raveau, Claire Macher, Sonia Méhault, Mathieu Merzereaud, Christelle Le Grand, Olivier Guyader, Michel Bertignac, Spyros Fifas, and Jordi Guillen. A bio-economic analysis of experimental selective devices in the norway lobster (*nephrops norvegicus*) fishery in the bay of biscay. *Aquatic Living Resources*, 25(3):215–229, 2012

Economic assessment of a balanced harvesting system - A Charles, SM Garcia, and J Rice. Balanced harvesting in fisheries: economic considerations. *ICES Journal of Marine Science: Journal du Conseil*, 73(6):1679–1689, 2016

Economic impact from a fishermen’s perspective - Niels Vestergaard. Discard behavior, highgrading and regulation: the case of the greenland shrimp fishery. *Marine Resource Economics*, 11(4):247–266, 1996

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Calculating Discards

Discards database and calculations - Kieran Kelleher. Discards in the world's marine fisheries. an update. FAO Fisheries Technical Paper 470, FAO, Rome, Italy, 2005

Issues with extrapolating discards data from on-observers to vessels without on-board observers - Hugues P Benoît and Jacques Allard. Can the data from at-sea observer surveys be used to make general inferences about catch composition and discards? *Canadian Journal of Fisheries and Aquatic Sciences*, 66(12):2025–2039, 2009

Calculating numbers-at-age for fish discards from landings-at-age data - J Casey. Estimating discards using selectivity data: the effects of including discard data in assessments of the demersal fisheries in the irish sea. *Journal of Northwest Atlantic Fishery Science*, 19:91–102, 1996

The amount of sampling required to determine discards by gear and country - Michelle Allen, David Kilpatrick, Mike Armstrong, Richard Briggs, Grant Course, and Nélide Pérez. Multistage cluster sampling design and optimal sample sizes for estimation of fish discards from commercial trawlers. *Fisheries Research*, 55(1):11–24, 2002

Determining discard hotspots using spatio-temporal bayesian models - M Grazia Pennino, Facundo Muñoz, David Conesa, Antonio López-Quílez, and José M Bellido. Bayesian spatio-temporal discard model in a demersal trawl fishery. *Journal of Sea Research*, 90:44–53, 2014

Data Issues

Review of current discard data collection methodologies and the associated issues - Jose M Bellido, M Begoña Santos, M Grazia Pennino, Xulio Valeiras, and Graham J Pierce. Fishery discards and bycatch: solutions for an ecosystem approach to fisheries management? *Hydrobiologia*, 670(1):317, 2011

Discard data issues under two different regulatory regimes - André E Punt, David C Smith, Geoff N Tuck, and Richard D Methot. Including discard data

in fisheries stock assessments: two case studies from south-eastern australia. *Fisheries Research*, 79(3):239–250, 2006

Background to data issues including extrapolation issues - Kieran Kelleher. Discards in the world’s marine fisheries. an update. FAO Fisheries Technical Paper 470, FAO, Rome, Italy, 2005

Including Discards in EAFM

How to incorporate discard data into EAFM within an EU context - Jose M Bellido, M Begoña Santos, M Grazia Pennino, Xulio Valeiras, and Graham J Pierce. Fishery discards and bycatch: solutions for an ecosystem approach to fisheries management? *Hydrobiologia*, 670(1):317, 2011

Incorporating discard data into EAFM to determine year class distributions - André E Punt, David C Smith, Geoff N Tuck, and Richard D Methot. Including discard data in fisheries stock assessments: two case studies from south-eastern australia. *Fisheries Research*, 79(3):239–250, 2006

Inclusion of discard data into fisheries life cycle assessments - Ian Vázquez-Rowe, Ma Teresa Moreira, and Gumersindo Feijoo. Inclusion of discard assessment indicators in fisheries life cycle assessment studies. expanding the use of fishery-specific impact categories. *The International Journal of Life Cycle Assessment*, 17(5):535–549, 2012

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