

# An economic analysis of quota allocation under a landing obligation

Fisheries Innovation Scotland study FIS012B

Aaron Hatcher  
University of Portsmouth

Bi-Annual Scottish Fishing Conference  
University of St Andrews, 9-10 July 2018

# Aims

- ▶ To model LO economic impacts and chokes for the Scottish demersal fleet by gear type and PO (under existing quota allocation)
- ▶ **To assess whether outcomes under a full LO can be improved if Scottish quota is reallocated between (groups of) vessels**

# The model

- ▶ Profit maximisation: variables are fishing days (and quota allocations)
- ▶ Scottish (>10m) demersal fleet activity segmented by PO, gear type and sea area
- ▶ Baseline: 2015 (final) quota allocations, effort and landings
- ▶ Quota allocations: by PO as recorded; by gear based on landings
- ▶ *Catch* rates based on recorded landings and ICES estimated discard rates (as Seafish study)
- ▶ Quota uplifts under LO - as Seafish study
- ▶ Landing obligation: discards forced to zero
- ▶ Model allocates days across gears and areas (where vessels exhibit flexibility) subject to a maximum of 260 days per vessel
- ▶ Model allocates quotas by PO and gear type (not vessel)

## Notes/simplifications/assumptions

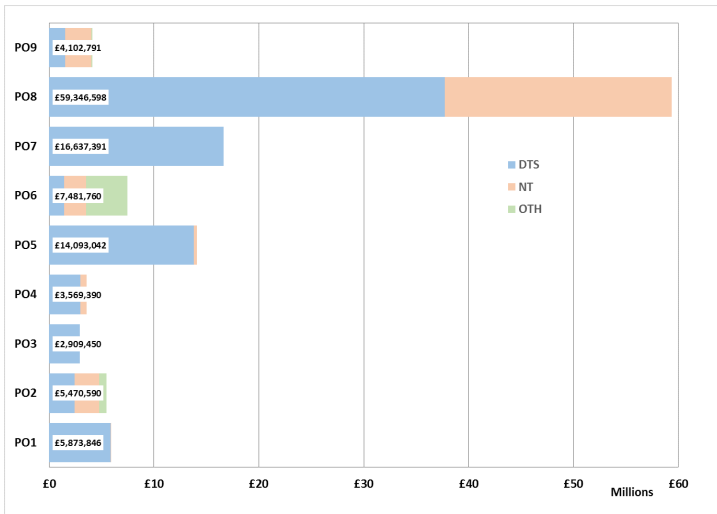
- ▶ Operating profits (no crew shares or fixed/boat costs deducted)
- ▶ Quota lease payments not deducted (transfers of profit)
- ▶ Estimates of undersize fish in discards (or landings under a LO) unavailable
- ▶ All landings assumed sold at the *same* ex-vessel price (2015 averages per species)
- ▶ Fishing costs are *averages* per vessel for each segment based on Seafish data (scaled by kW)
- ▶ We assume both quota compliance and LO compliance
- ▶ No *de minimis* or other exemptions/allowances
- ▶ Zero TAC species assumed landed (Area VI cod/whiting)
- ▶ No changes in behaviour/avoidance/selectivity: relative catch rates remain the same under LO

## Scenario A

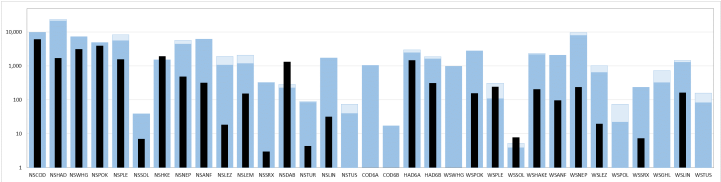
- ▶ Quotas as final PO allocations for 2015
- ▶ Fishing days as recorded in 2015
- ▶ Catches based on 2015 landings data plus estimated discard rates
- ▶ This is the baseline or “business as usual” scenario for 2015. Landings as recorded for 2015 except where there is unused quota the model will have attempted to fill available quota with previously discarded fish.

<b>Fishing method</b>	<b>Effort (days)</b>	<b>Profits (£m)</b>
Demersal trawls/seines	20,903	£85.3
<i>Nephrops</i> trawls	21,113	£29.4
Other gears	3,306	£4.8
Total	45,322	£119.5

# Scenario A: profits by PO and gear type



# Scenario A: quota uptake and discards



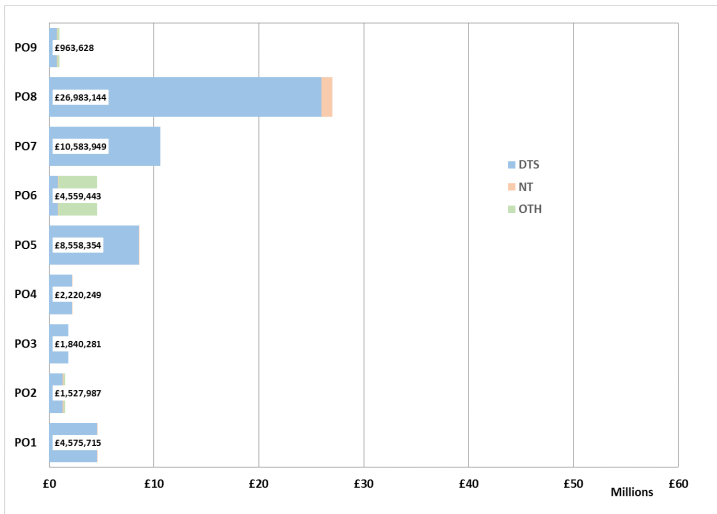
## Scenario B

- ▶ LO imposed for all stocks except those with zero quotas (area VI cod and whiting)
- ▶ Quotas as final PO allocations for 2015 plus uplifts
- ▶ Fishing days adjusted to maximise profits
- ▶ The LO is imposed for all stocks but POs' quota allocations remain as they were at the end of 2015, including all swaps (domestic and international). All quotas are increased *pro rata* according to estimates of likely uplifts for the TACs.

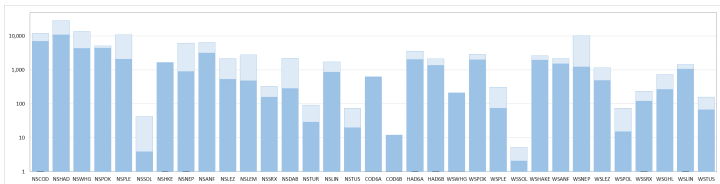
<b>Fishing method</b>	<b>Effort (days)</b>	<b>Profits (£m)</b>
Demersal trawls/seines	11,440 (55%)	£56.6 (66%)
<i>Nephrops</i> trawls	622 (3%)	£1.2 (4%)
Other gears	3,528 (107%)	£4.0 (84%)
Total	15,591 (34%)	£61.8 (52%)



# Scenario B: profits by PO and gear type



# Scenario B: quota uptake

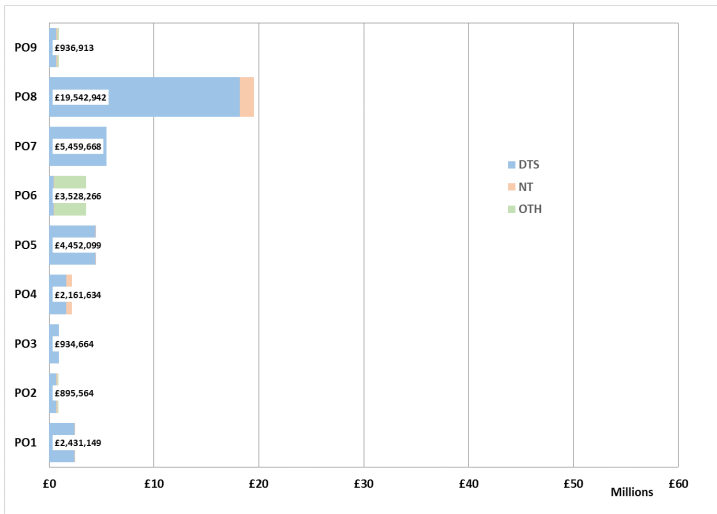


## Scenario C

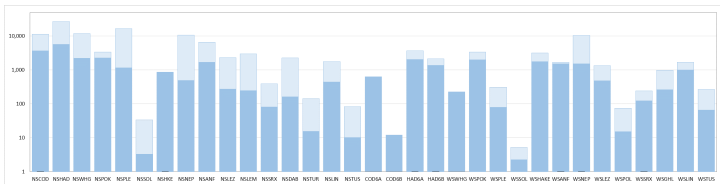
- ▶ LO imposed for all stocks except those with zero quotas (area VI cod and whiting)
- ▶ Quotas as final PO allocations for 2015 *without international swaps*, plus uplifts
- ▶ Fishing days adjusted to maximise profits
- ▶ This is the “worst case” scenario for full implementation of the LO. POs’ quota allocations as they were at the end of 2015 but corrected for the (estimated) contribution of international swaps. Remaining quotas increased *pro rata* according to estimated uplifts for the TACs.

<b>Fishing method</b>	<b>Effort (days)</b>	<b>Profits (£m)</b>
Demersal trawls/seines	7,402 (35%)	£34.9 (41%)
<i>Nephrops</i> trawls	1,383 (7%)	£2.1 (7%)
Other gears	3,235 (98%)	£3.4 (70%)
Total	12,020 (27%)	£40.3 (34%)

# Scenario C: profits by PO and gear type



# Scenario C: quota uptake



# Scenario C: chokes

days (2015 days)

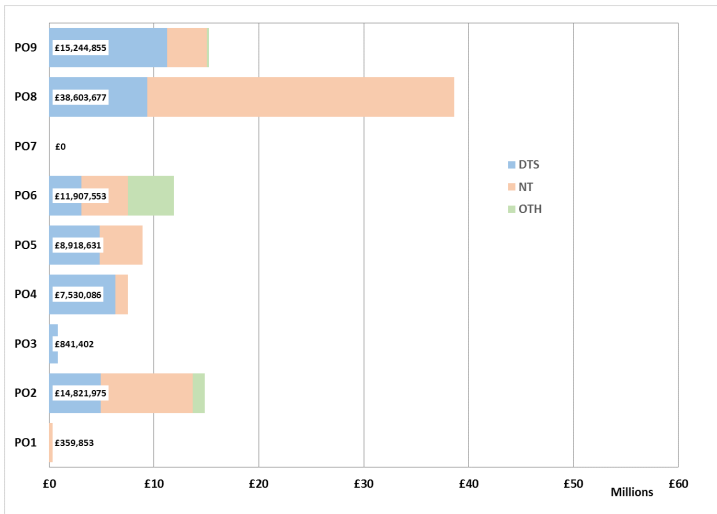
PO	Demersal trawls/seines		<i>Nephrops</i> trawls		Other gears	
	Area IV	Area VI	Area IV	Area VI	Area IV	Area VI
1	hake	haddock VIa	hake	haddock VIa	---	---
	383 (1,288)	81 (135)	0 (15)	0 (6)	---	---
2	hake	skates/rays	cod	haddock VIa	whiting	---
	232 (926)	43 (146)	31 (1,547)	3 (65)	19 (250)	---
3	hake	haddock VIa	---	---	---	---
	109 (414)	0 (22)	---	---	---	---
4	hake	haddock VIb	cod	skates/rays	---	---
	116 (299)	132 (250)	2 (78)	568 (558)	---	---
5	hake	haddock VIa	cod	haddock VIa	---	---
	774 (3,056)	44 (233)	3 (143)	0 (21)	---	---
6	hake	haddock VIa	cod	haddock VIa	hake	monkfish
	82 (330)	22 (313)	11 (549)	3 (875)	352 (626)	1,081 (1,339)
7	hake	haddock VIb	---	---	---	---
	742 (2,937)	32 (55)	---	---	---	---
8	hake	monk	cod	haddock VIa	---	---
	1,734 (6,796)	2,774 (3,438)	75 (3,716)	606 (10,977)	---	---
9	hake	haddock VIa	haddock	haddock VIa	---	---
	28 (109)	74 (156)	26 (89)	55 (2,474)	---	---

## Scenario D

- ▶ As Scenario C but with quotas reallocated between all vessel groups
- ▶ The LO is implemented for all stocks and quotas are at 2015 levels, without international swaps, but with uplifts applied. Quota is reallocated “optimally” between POs and between gear types within each PO. Effort is adjusted automatically in order to maximise profits for each vessel group.
- ▶ Total landings (all species) increases from 32,790 tonnes under Scenario C to 64,576 tonnes

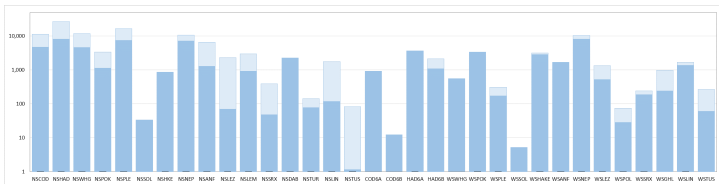
<b>Fishing method</b>	<b>Effort (days)</b>	<b>Profits (£m)</b>
Demersal trawls/seines	8,421 (40%)	£40.5 (48%)
<i>Nephrops</i> trawls	21,946 (104%)	£52.0 (177%)
Other gears	4,064 (123%)	£5.7 (119%)
Total	34,430 (76%)	£98.2 (82%)

# Scenario D: profits by PO and gear type





# Scenario D: quota uptake

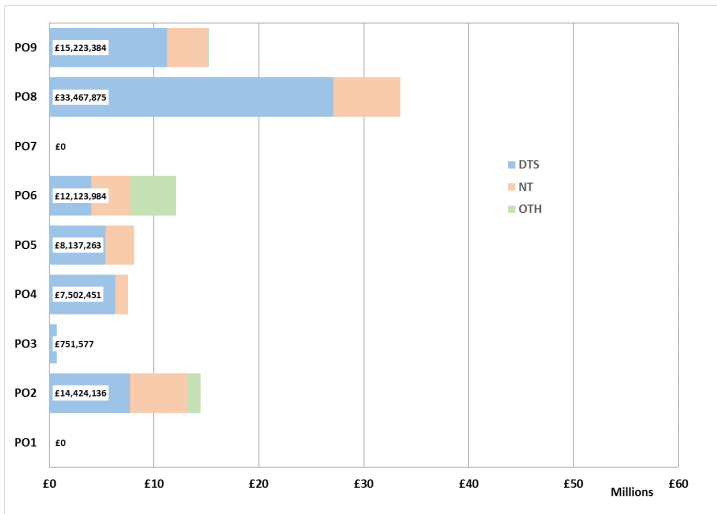


## Scenario D2

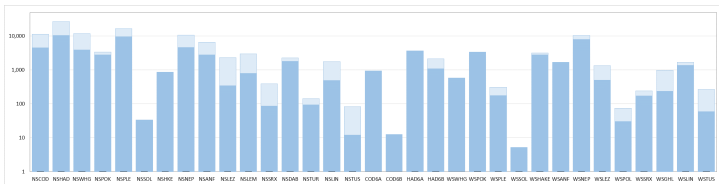
- ▶ As Scenario D but with prawn trawlers' revenues from whitefish landings reduced by 50%
- ▶ Total landings (all species) increases to 68,861 tonnes
- ▶ A reduction of 75% in prawn boats' whitefish revenues results in only minor changes to these figures

<b>Fishing method</b>	<b>Effort (days)</b>	<b>Profits (£m)</b>
Demersal trawls/seines	13,409 (64%)	£62.5 (73%)
<i>Nephrops</i> trawls	15,412 (73%)	£23.3 (79%)
Other gears	4,080 (123%)	£5.8 (122%)
Total	32,901 (73%)	£91.6 (77%)

## Scenario D2: profits by PO and gear type



# Scenario D2: quota uptake



# Conclusions

- ▶ Focus on general magnitude and direction of effects - not detail
- ▶ Study only looked at quota allocation at the Scottish level
- ▶ Quota only reallocated between groups - not individual vessels
- ▶ Nevertheless, study suggests that quota reallocation may be *part* of the solution
- ▶ Importance of flexibility in quota allocation (trading?)
- ▶ Importance of international swaps (at least under relative stability)

## Link to final report

<http://www.fiscot.org/media/1391/fis012b.pdf>