

The story of the orange roughy

Dr Matthew Dunn

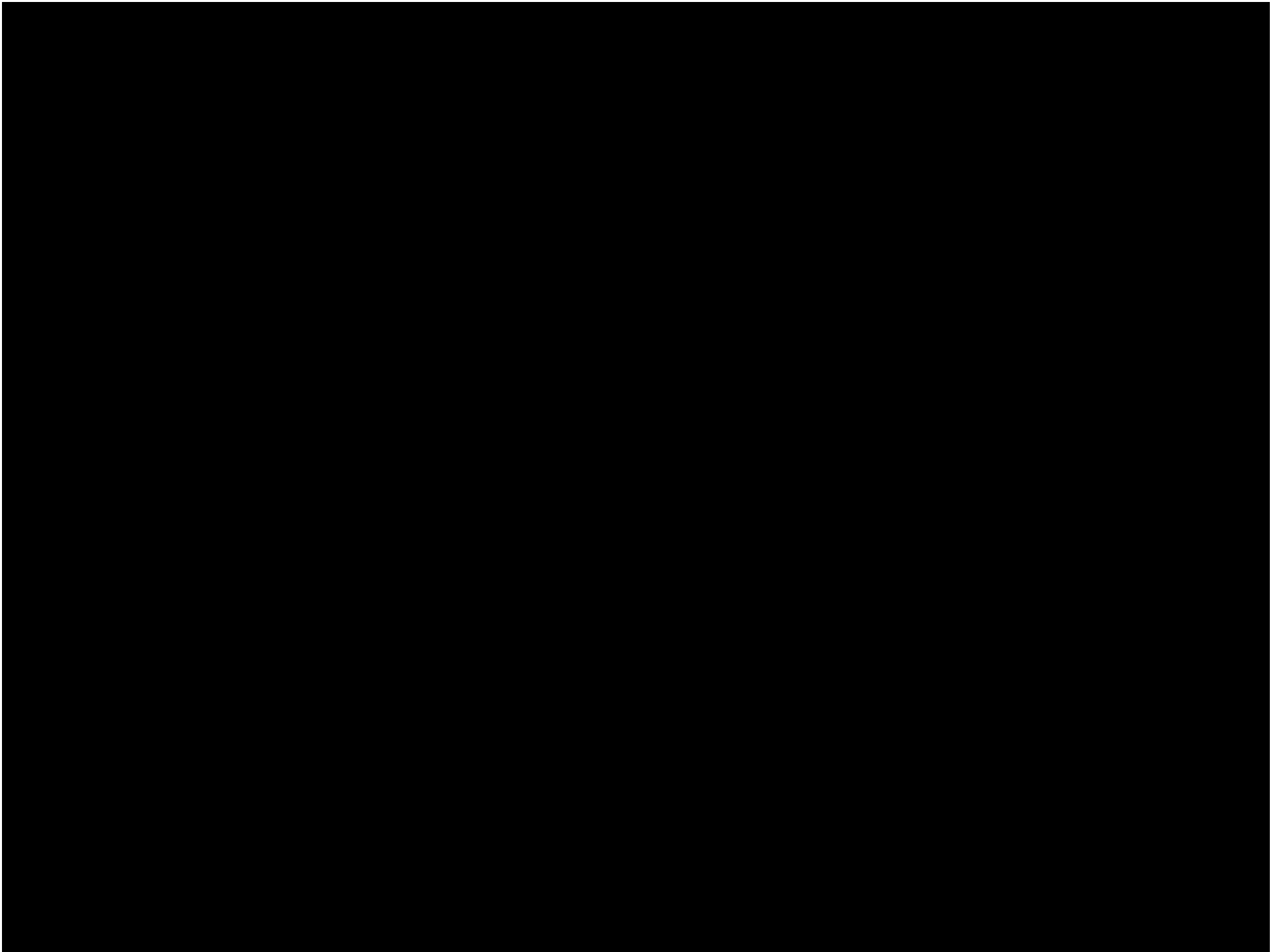
BIOL427 Current Issues in Marine Science

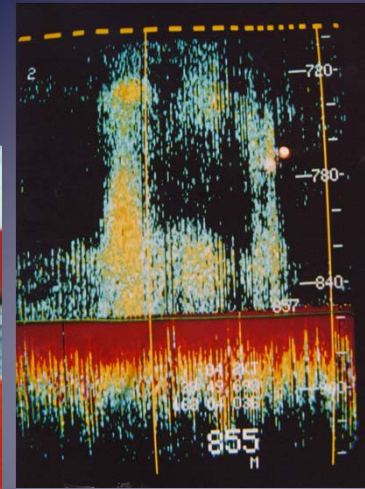
April 2014



Hoplostethus atlanticus

The “slimehead”, “deep sea perch”, or “orange roughy”



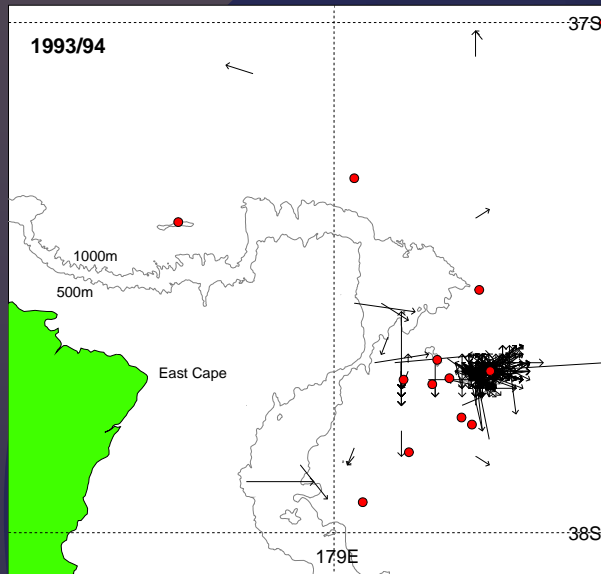


The gold rush years

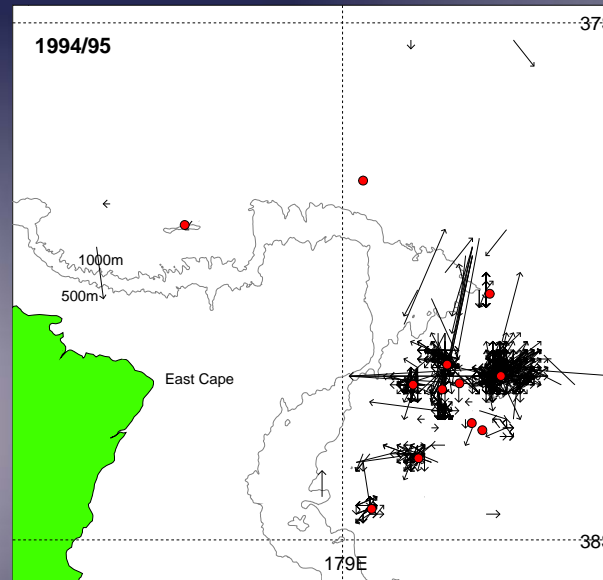
Big aggregations

Big boats

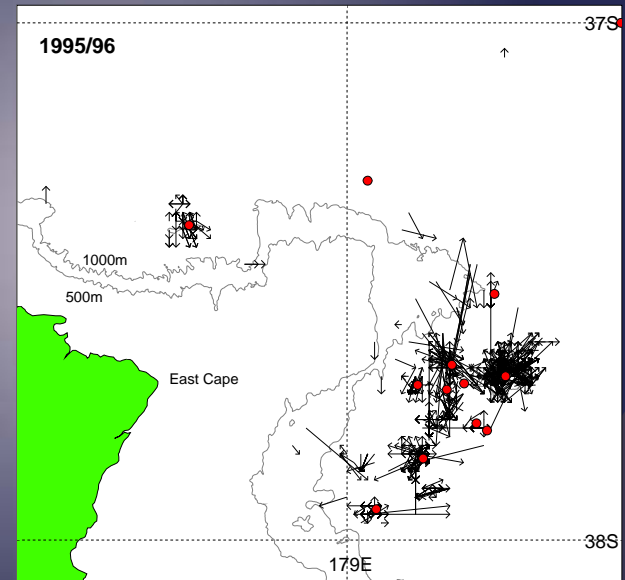
Big money



Year 1 - 1 hill



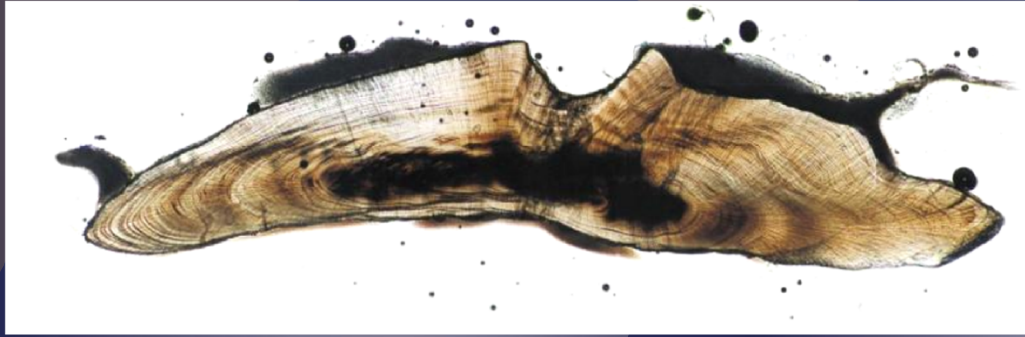
Year 2 - 6 hills



Year 3 - 8 hills

Fast fisheries

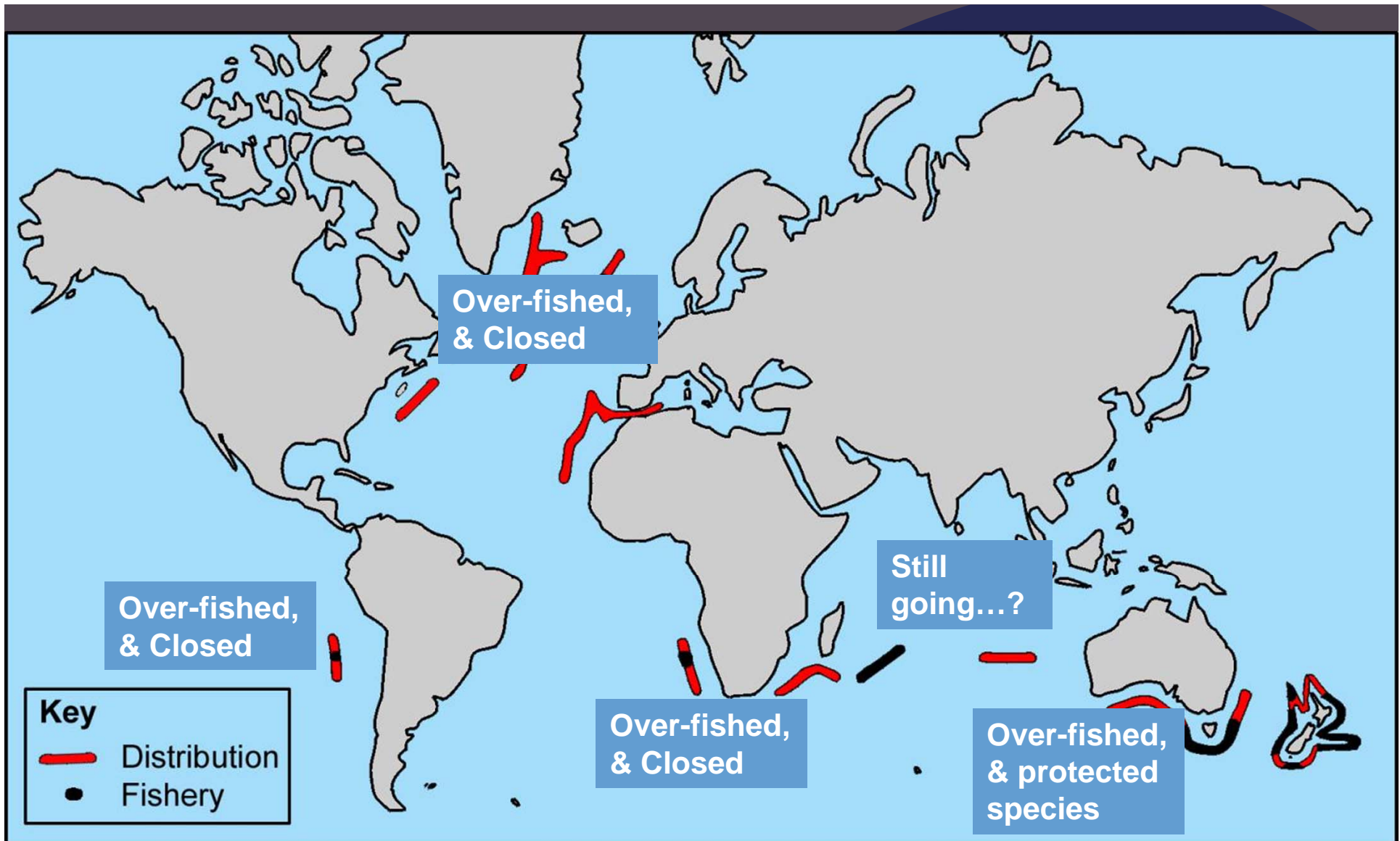
Sequential depletion, or "boom and bust" fishing



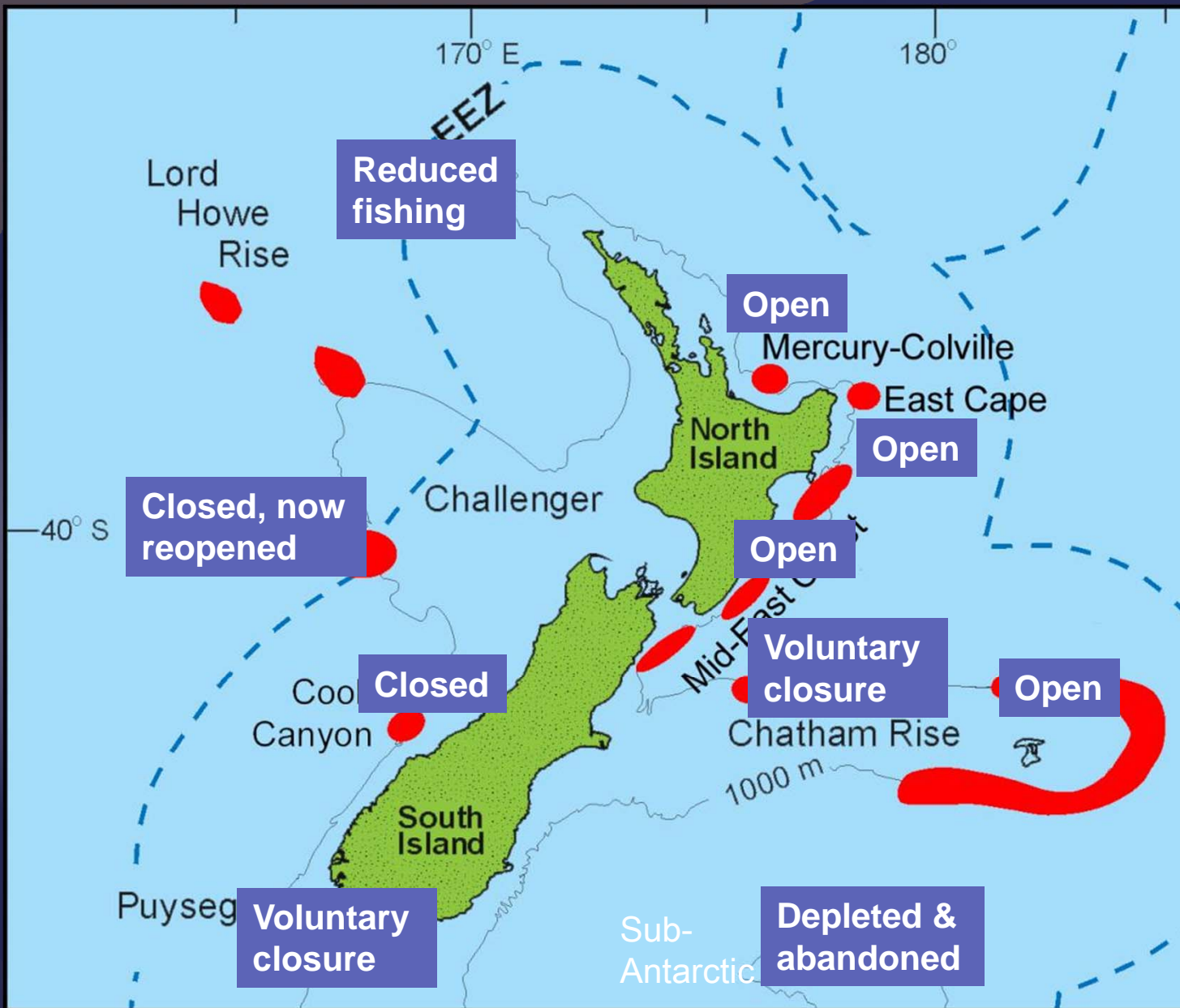
Slow fish

Common in the deep sea

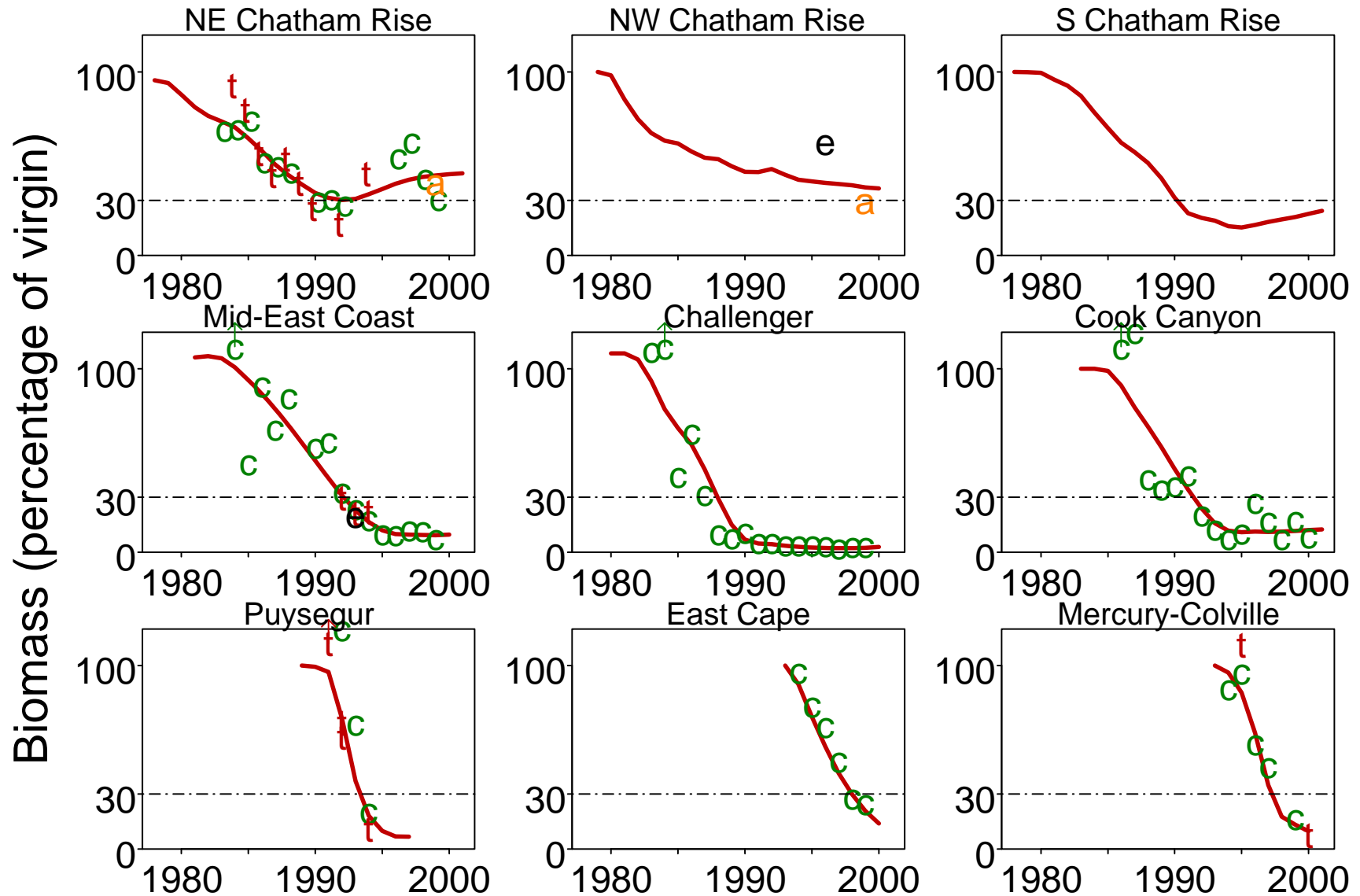
They grow slowly, mature late, don't breed every year, and live long – a classic unproductive, K-strategist



Orange roughy around the world



Stock assessment results (2003)



Open slather fishery headed for disaster

By JAMES GARDINER

WORLD governments made one mistake when they negotiated the 200-mile exclusive economic zone. Nobody told the fish.

Zealand fisheries scientists are forgiven for regretting the light as the Challenger



The fishery was over-exploited and catches in relation to fishing effort had declined markedly in recent years, scientists Malcolm Clark and Chris Francis said.

"Continued fishing outside the EEZ is a severe constraint to effective management of the fishery inside the EEZ," they concluded.

The dilemma for the Government is whether to allow

Fishing firms agree to help save roughy

Wellington (PA) — Fishing companies agreed yesterday to use their clout with foreign fishing countries to help the Government save the Challenger Plateau orange roughy fishery.



To return, the Minister of Fisheries, Mr Shirley, has backed down from a plan to count roughy landed in New Zealand, but caught outside the 200-mile zone.

Mr Shirley said yesterday that he was cancelling the Crown-held quota of about 600 tonnes to help reduce the total allowable catch which is set at about 12,000 tonnes.

The Fishing Industry Association responded by announcing it would voluntarily reduce operators' maximum catches by 20 per cent from about 500 tonnes to about 400 tonnes.

The association president, Mr Peter Taylor, said the industry "will accept further controls so long as they are in the new

Ministers discuss plan to cut orange roughy catch

By OLIVER RIDDELL in Wellington

SAVING New Zealand's most valuable deep-sea fish species from a severe decline is the main goal of a plan to cut the orange roughy catch.

'Don't panic' on roughy

"We don't necessarily accept the research information at this stage," he said. "I hope that with the report of the consultants the whole position will be much clearer."

Last year 55,000 tonnes of orange roughy was caught, earning \$10 million in foreign exchange for New Zealand.

Roughy catch heavily cut

By OLIVER RIDDELL in Wellington

The total allowable catch this season for one of the country's top fisheries species — orange roughy — has been cut drastically by the Government.

The cut for orange roughy on the Challenger Plateau, which is the north-west of the South Island, is from 600 tonnes to 2500 tonnes in the part of the zone outside the 200-mile zone.

Orange roughy catch slashed

Fisheries Minister Ken Shirley has announced a cut of more than 75 percent in the Challenger Plateau orange roughy fishery for this season.

The total allowable catch (TAC) for the fishery, which straddles the western boundary of New Zealand's exclusive economic zone, will be reduced from 12,000 tonnes to 2500 tonnes.

The cuts take effect from next week, at a time when the orange roughy fishery is in full swing.

Mr Shirley has also halved the commercial catch of snapper in the Tasman-Golden Bay-Marlborough Sounds area from 372 tonnes to 160 tonnes.

Australia asked to help save roughy fishery

FISHERIES MINISTER Ken Shirley yesterday made a plea for Australian assistance to save New Zealand's second-largest orange roughy fishery.

By JAMES GARDINER, Staff Reporter

Shirley said he had written to Australian Fisheries Minister Ian Turner last week asking for help in New Zealand's fight against the roughy quota, regarding the Challenger Plateau orange roughy fishery.

Minister on orange roughy trip

Both countries are forcing immediate changes in their policies.

Mr Shirley said he will visit Australia this weekend for talks with his Australian counterpart on ways to establish a regime to save the orange roughy fishery.

The lifespan of orange roughy is similar to that of humans. They live to 60 and 100 years.

"I will urge that we take a collective approach on this and that we establish a regime that can ensure the continued management on a sustainable basis."

"That is the objective and I think we can do it," Mr Shirley said.



“Clear-felling” the deep

Watling & Norse (1998) *Conservation Biology* 12: 1180-1197

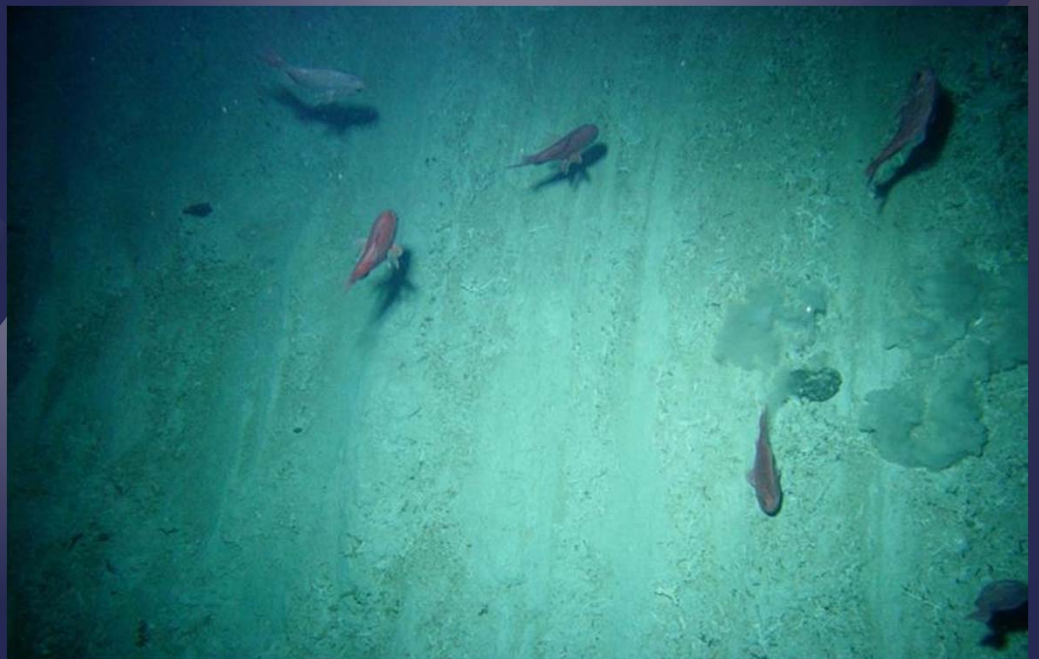


Deep sea trawls

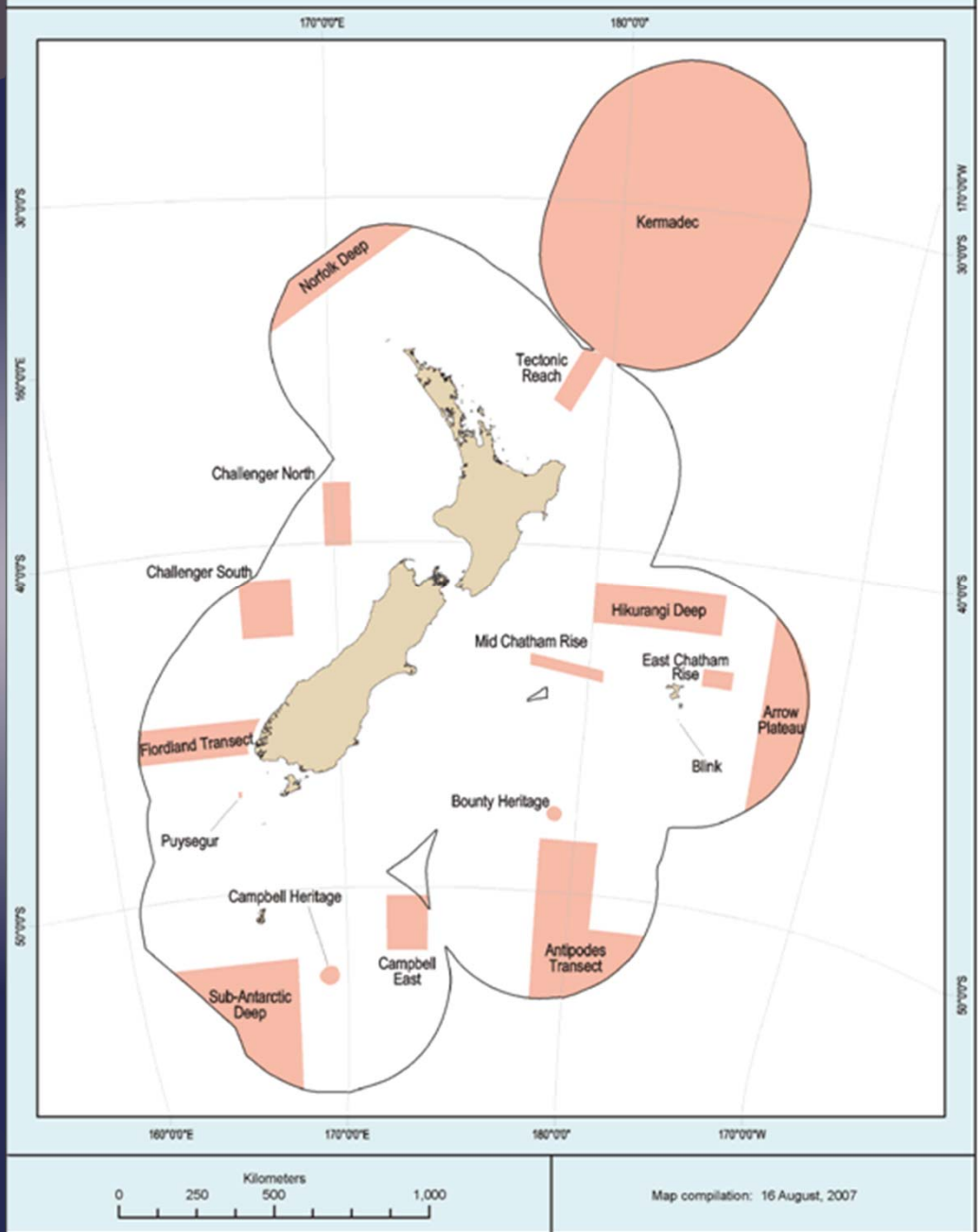
Area swept can be ~7 m high and 120 m wide

Ground rope can have a dozen 60 cm steel bobbins

Trawls doors up to ~6 tonnes, total weight to ~40 tonnes



Locations of Benthic Protection Areas



The story most people know...

Clark (2001) Are deepwater fisheries sustainable? — the example of orange roughy (*Hoplostethus atlanticus*) in New Zealand. *Fisheries Research* 51: 123-135

Roberts (2002) Deep impact: the rising toll of fishing in the deep sea. *Trends in Ecology & Evolution* 17: 242-245

Norse, Brooke, Cheung, Clark, Ekeland, Froese, Gjerde, Haedrich, Heppell, Morato, Morgan, Pauly, Sumaila, Watson (2012) Sustainability of deep-sea fisheries. *Marine Policy* 36: 307-320

“deep-sea fisheries [are] unsustainable with very few exceptions”

“An ecologically and economically preferable strategy would be rebuilding and sustainably fishing resilient populations in... shallower and more productive marine ecosystems that are closer to markets”

The market response

“New Zealand orange roughy fisheries are well managed”

- Ministry of Fisheries 30 March 2010

<http://www.fish.govt.nz/en-nz/Press/Press+Releases+2010/March10/New+Zealand+orange+roughy+fisheries+are+well+managed.htm?WBCMODE=PresentationUnpublished%252c>

“Supermarkets that no longer sell orange roughy, or have made a commitment to stop selling it, are Marks and Spencer, Waitrose, Sainsbury’s, Whole Foods Market, Ahold, The Great Atlantic and Pacific Tea Company”


<http://www.infonews.co.nz/news.cfm?l=1&t=140&id=36709>

...and Canada

<http://www.scoop.co.nz/stories/PO1009/S00330/canadians-say-no-to-orange-roughy.htm>

Fish Choices – Ecological Rankings

Best choice



Anchovy	Pilchards
Sprats	Cockles
Garfish	Kina
Tuna (Skipjack)	Kahawai
Cod (Blue)	Mullet (Yellow-eyed)
Trevally	Lobster (Packhorse)
John dory	Gurnard (Red)
Lobster (Rock/Crayfish)	Mullet (Grey)
Kingfish	Moki (Blue)
Crabs (Paddle)	Cod (Red)
Tuna (Albacore)	Paua
Butterfish	Tarakihi
Creamfish / Leather jacket	Monkfish / Stargazer
Mackerel (Blue)	Whiting (Southern Blue)
Frostfish / Cutlassfish	Warehou (Silver)
Scallops (Queen)	Trumpeter (Striped)
Hake	Cod (Deepsea) / Ribaldo
Scallops (other)	Warehou (Blue)
Warehou (White)	Barracouta
Alfonsino	Hoki
Elephantfish	Shark (Dark ghost)
Ling	Groper / Hapuka
Gemfish	Dory (Lookdown)
Oyster	Shark (Pale ghost)
Snapper (Red)	Shark (Spiny dogfish)
Shark (School)	Eels
Flatfish	Tuna (Bigeye)
Swordfish	Tuna (Yellowfin)
Sea perch	Tuna (Pacific bluefin)
Scampi	Marlin (Striped)
Skates	Shark (Lemonfish/Rig)
Squid (Arrow)	Mackerel (Jack)
Bluenose	Shark (Blue)
Snapper	Shark (Mako)
Tuna (Southern bluefin)	Dory (Deepwater) / Oreos
Shark (Porbeagle)	Orange roughy

Worst choice



Marine Stewardship Council

Certified sustainable seafood

The MSC evaluates fisheries using three principles:

P1: Sustainability of exploited fish stocks - *The fishery must be conducted in a manner that does not lead to over-fishing*

P2: Maintenance of the ecosystem on which the fishery depends - *Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem*

P3: Effective and responsible management - *The fishery is subject to an effective management system*





Studies have found consumers are prepared to pay about 10% more for an eco-labelled product (Erwann 2009).

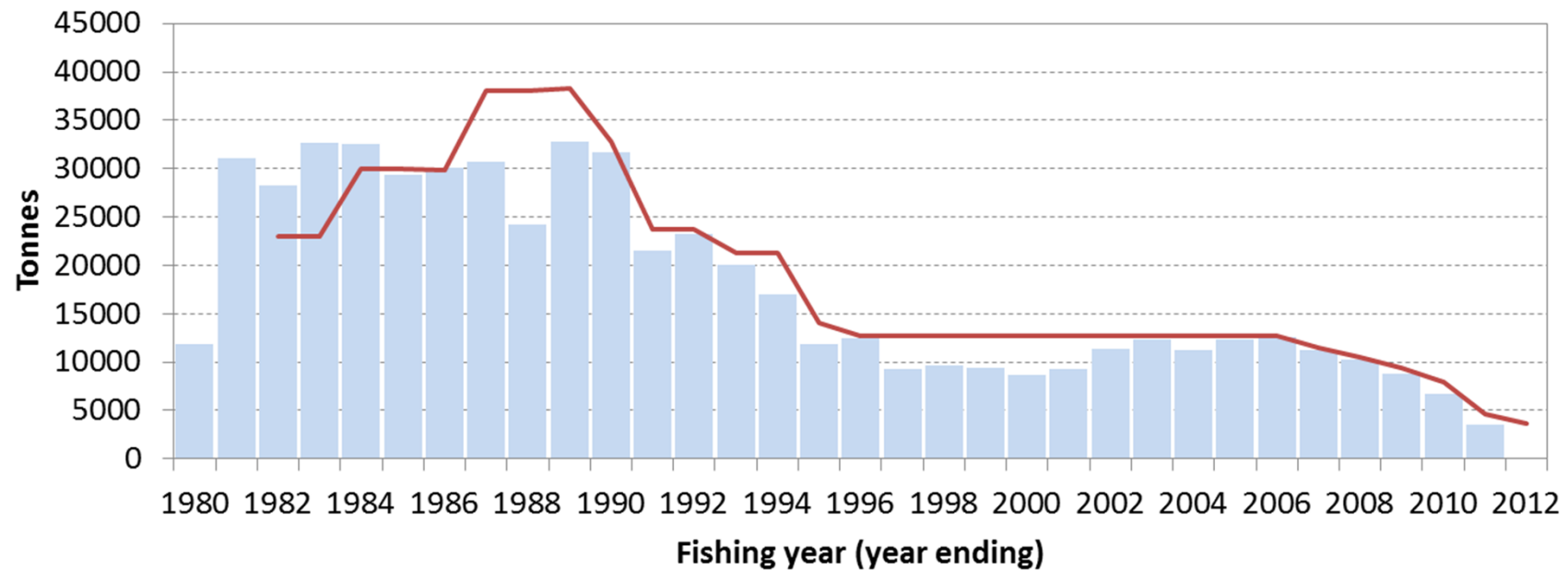
MSC certified products received a price about 14% higher than equivalent non-certified products (Roheim et al. 2011).

UK retailers targeting eco-labelled seafood products have reported increased market share (The Guardian 2012).



Is orange roughy ready?

The incentive is there, do we have the science, the fish stock recovery, the environmental credentials?



AGEING

Kotlyar (1981)
Aged to 24 yrs

Van den Broek (1983)
Aged to 21 years

Sullivan & Parkinson (1987)
Long lived (40+ yrs)

Gauldie et al. (1989)
Aged to 20 yrs

Mace et al. (1990)
Partial validation
Long-lived (50+ yrs)

Fenton et al. (1991)
Radiometric validation
Long-lived

Doonan (1994)
Ageing of 1984 samples

Romanek & Gauldie (1996)
Not long-lived

Merrett & Haedrich (1997)
"debate not settled"

Tracey & Horn (1999)
Most likely long lived

Dunn (2006)
Assessment
1984 & 1990 age data

Francis (2006)
Problems ageing

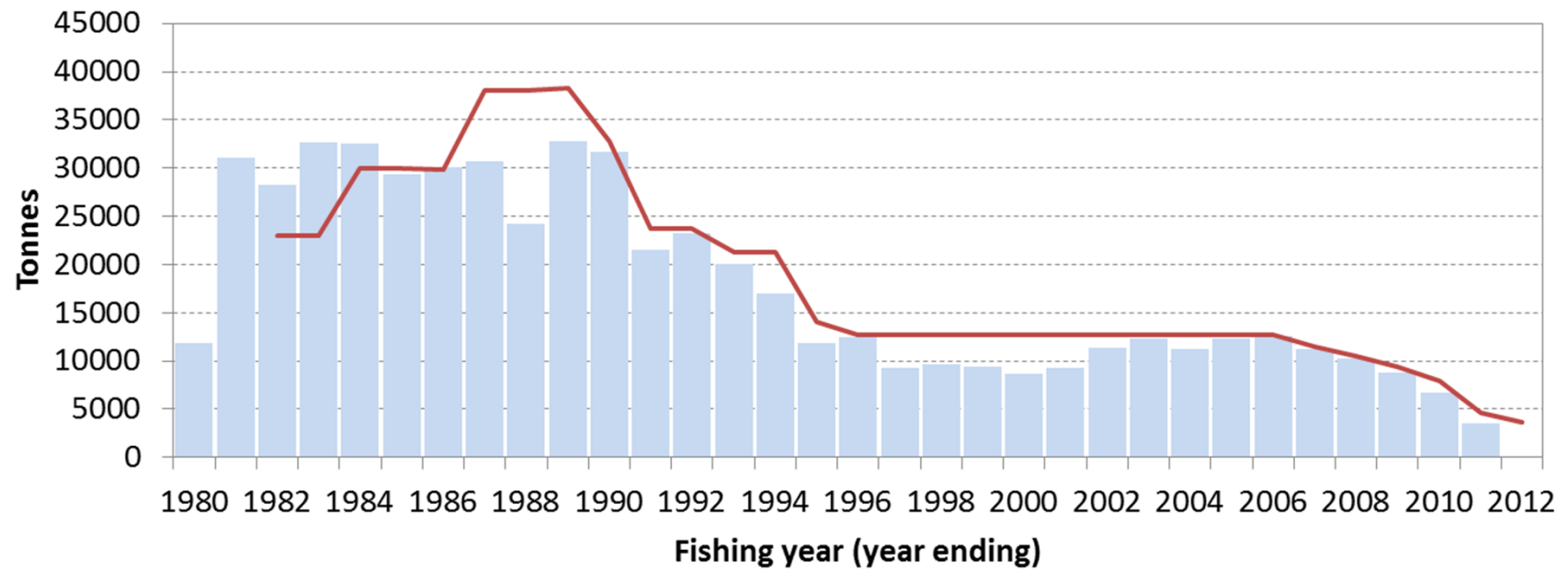
Dunn (2007)
Assessment, no age data

2007
Ageing workshop

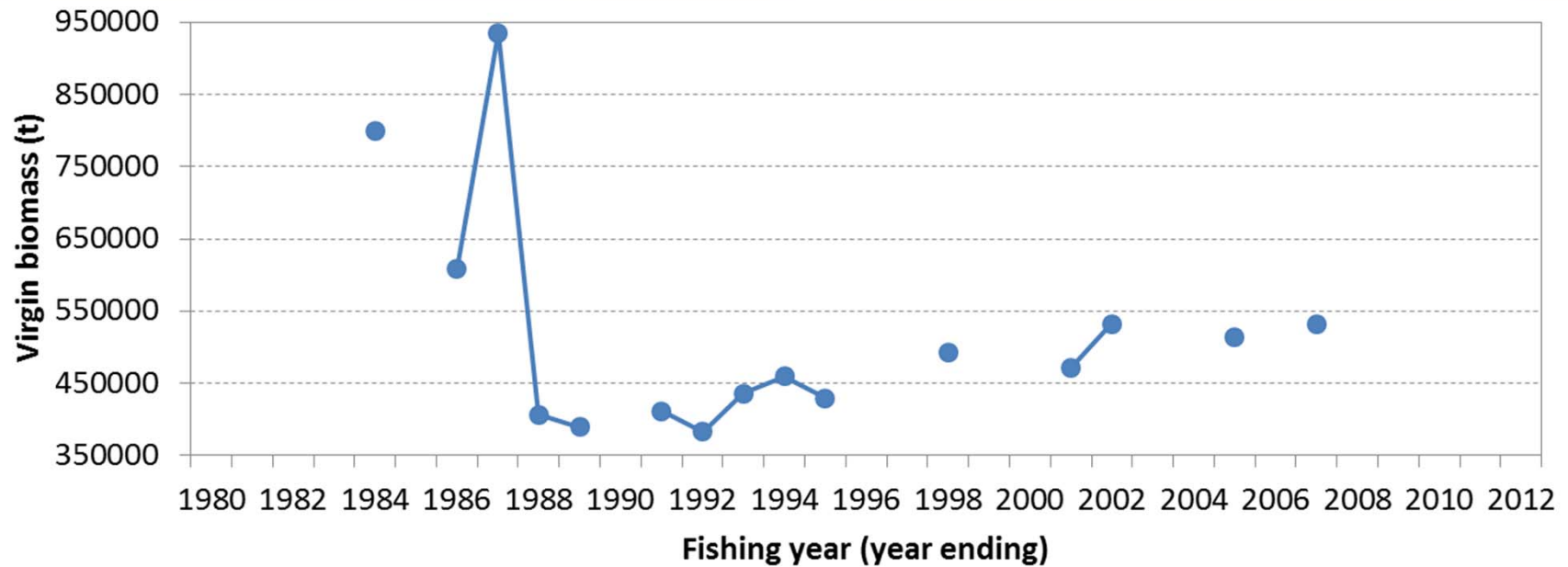
2008
Cross-ageing study

Andrews et al. (2009)
Radiometric validation
Long-lived (100 yrs)

2011-12
Ageing
starts again



POPULATION MODELS





Is the best science good enough?

New spawning biomass has certainly appeared

Current catches are relatively low

Science is vital, but it doesn't know everything



To balance exploitation and conservation, elements of spatial management are required (Clark & Dunn 2012 Environmental Conservation 39)

Do we blame current fishers for past misdemeanours?



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 Species_ORH_AEEF

MSC Pre-assessment of New Zealand Orange Roughy Fisheries

SUPPORTING DOCUMENT

[ORH Pre-Assessment Reference List v3 210813](#)

P1 Documents

[DWG \(2013\) Briefing Note – ORH3B \(NWR\) Summary](#)

[DWG \(2011\) ORH OEO OP v4 2011-12 Schedule 1 \(insert\)](#)

Serious intent...

“An analysis of the formal objections indicates that the MSC’s principles for sustainable fishing are too lenient and discretionary, and allow for overly generous interpretation by third-party certifiers and adjudicators, which means that the MSC label may be misleading both consumers and conservation funders.”

Christian et al. (2013) *Biological Conservation* 161: 10-17

Current Issues - The story of the orange roughy

- ⌘ The MSC process is underway
- ⌘ Should we be fishing in the deep sea?
- ⌘ Is the New Zealand orange roughy fishery sustainable?
- ⌘ If New Zealand orange roughy is certified, will the consumer “buy it”?