Climate change, fisheries, and “fish wars”

Department of Ecology, Evolution, and Natural Resources
Institute of Earth, Ocean, and Atmospheric Sciences
Food for the world
Shifting distributions 1967

Legend - 1967

Value

- High
- Mid
- Low

Black sea bass
Centropristis striata

Pinsky et al. 2013 Science
http://oceanadapt.rutgers.edu
Shifting distributions 1967-2014

Legend - 2014

Value
- High
- Mid
- Low

500 km

Black sea bass
Centropristis striata
Many species on the move

20 km per decade

Pinsky et al.
2013 Science
Many species on the move

Pinsky et al. 2013 Science
Bottom-up fishery adaptation

• Travel further

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Bottom-up fishery adaptation

- Travel further
- Switch ports

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Bottom-up fishery adaptation

- Travel further
- Switch ports
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Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Bottom-up fishery adaptation

- Travel further
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- Switch species
- Leave fishing

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Bottom-up fishery adaptation

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Regulations
Economics
Technology

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Bottom-up fishery adaptation

- Travel further
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Regulations
Economics
Technology

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Longer fishing trips

1996

From Vessel Trip Reports

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Longer fishing trips

From Vessel Trip Reports

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Specialist fishers in a changing world

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Summer flounder: allocation of landings

Young et al. 2018 ICES J Marine Science; Dubik et al. 2018 Marine Policy
Challenges from crossing boundaries

Summer flounder
Paralichthys dentatus
Challenges from crossing boundaries

Summer flounder
Paralichthys dentatus
2016
International: Mackerel wars
“A large proportion of the militarized disputes between democracies in the post-WWII period involve fisheries...”

Mitchell & Prins 1999 International Studies Quarterly
Underprepared for fisheries on the move across political boundaries
How much of a problem?
Species distribution models

892 species

Pinsky et al. 2018 Science
Exclusive economic zones

www.marineregions.org
New transboundary stocks by 2100

A

Number of transboundary species

1 2 3 4 5 6 7 8 9 10 11 >12

Pinsky et al. 2018 Science
Less potential conflict with lower emissions

Pinsky et al. 2018 Science
What solutions exist?
Cooperate to build shared knowledge

http://oceanadapt.rutgers.edu
Shared oversight and joint limits

Catch

Fishing

Overfishing
Mechanisms for reciprocity

Side payments

Miller et al. 2000 Climatic Change
Mechanisms for reciprocity

Tradeable permits and updated allocations

Parties to the Nauru Agreement

Aqorau et al. 2018 Science
Summary

• Underprepared for fisheries on the move across political boundaries
Summary

• Underprepared for fisheries on the move across political boundaries
• Fisheries are set to move across 70+ new national boundaries
Summary

• Underprepared for fisheries on the move across political boundaries
• Fisheries are set to move across 70+ new national boundaries
• We have tools to avoid the loss of fish, food, and employment
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Summary

• Underprepared for fisheries on the move across political boundaries
• Fisheries are set to move across 70+ new national boundaries
• We have examples and governance tools to avoid the loss of fish, food, and employment

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