Global meta-analysis of tuna and billfish stocks

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The tuna status debate

“...we estimate that large predatory fish biomass today is only about 10% of pre-industrial levels.”

“Current biomass ranges among species from 36 to 91% of the biomass predicted in the absence of fishing...”
• How badly overfished are tuna and billfish?

• How much yield are we losing from overfishing?

• How are different RFMOs performing in their management of tuna and billfish?
NCEAS working group: Finding common ground in marine conservation and management

Rebuilding Global Fisheries

Boris Worm,¹ Ray Hilborn,²* Julia K. Baum,³ Trevor A. Branch,² Jeremy S. Collie,⁴ Christopher Costello,⁵ Michael J. Fogarty,⁶ Elizabeth A. Fulton,⁷ Jeffrey A. Hutchings,¹ Simon Jennings,⁸,⁹ Olaf P. Jensen,² Heike K. Lotze,¹ Pamela M. Mace,¹⁰ Tim R. McClanahan,¹¹ Cóilín Minto,¹ Stephen R. Palumbi,¹² Ana M. Parma,¹³ Daniel Ricard,¹ Andrew A. Rosenberg,¹⁴ Reg Watson,¹⁵ Dirk Zeller¹⁵
A global stock assessment database currently > 350 stocks (147 fish, 16 invertebrate species)
Stock status worldwide

- 166 stocks
- 63% below MSY target
- 65% fished at rates below $U_{MSY}$

Worm et al. 2009 Science
Data

- 37 stock assessments of tunas (22), swordfish (6), and istiophorid billfishes (9)
- Catch
- Biomass
- Exploitation rates
- MSY reference points
- Price data (in progress)
Catch

Year

Catch (million tons)

- All others
- Swordfish
- Albacore tuna
- Bigeye tuna
- Yellowfin tuna
- Skipjack tuna
54%
Stock status by RFMO

Graph showing the stock status of different RFMOs with symbols indicating different regions on the chart.
No sign of lost productivity (in aggregate)
More yield lost to “underfishing”
Historically low productivity in overfished stocks
Conclusions

• As a group, tuna and billfishes are not overfished in terms of yield.
• Substantially more yield is lost from underfishing than from overfishing.
• 46% of stocks are below Bmsy (22% below half of Bmsy) and 40% are experiencing overfishing.
• Bluefin tuna and billfish stocks are more depleted.
Next steps

• Add economic analysis to investigate stock status with respect to MEY and subsidies.
• Compare geographic distribution of tuna yields to net primary productivity.
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