A reconstruction approach of total estimated fisheries removals i.e., unreported landings, recreational and discards in Turkey (1950-2010)

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A PLACE OF MIND

SEA AROUND US PROJECT
Fisheries, Ecosystems & Biodiversity

MISSION STATEMENT

- ***"The Sea Around Us Project"*** was initiated in 1999 to study the impact of fisheries on the marine ecosystems of the world, and to offer mitigating solutions to a range of stakeholders. We do this through Analyses & Visualizations, articles in peer-reviewed journals and other media.

- The Project regularly update our products at the scale of countries' Exclusive Economic Zones, Large Marine Ecosystems, the High Seas and other spatial scales, and as global maps and summaries. It also emphasize catch time series starting in 1950, and related series (e.g., catch value and catch by fishing gear or flag state), and fisheries-related information on every maritime country (e.g., government subsidies, marine protected areas, marine biodiversity). Information is also offered on special topics, e.g., the historic expansion of fisheries, the performance of Regional Fisheries Management Organizations, or the likely impact of climate change on fisheries.

SEA AROUND US PROJECT
Fisheries, Ecosystems & Biodiversity

MISSION STATEMENT

- The Sea Around Us project, was given the following questions to answer at its creation (1999) by *Pew Environment Group* (their funder):
- What are the total fisheries catches from marine ecosystems, including reported and unreported landings and discards at sea?
- Are the biological impacts of these withdrawals for the remaining life in the ecosystems?
- What would be the likely biological and ecological impacts of continuing current fishing trends?
- What were the former states of these ecosystems before the expansion of large-scale commercial fisheries?
- What specific management measures should be implemented to avoid continued worsening of the present situation and improve the '*health*' of marine ecosystems?

And now we have most of these answers...

Global catch reconstruction project

Aim: To estimate total fisheries removals for each maritime area on the world from 1950-2010, project to be completed in summer 2013.

Purpose: Public accounting of total natural resource use.
A complete enumeration of total fisheries removals for each country's maritime area(s) from 1950-2010.

Compare reported FAO landings with total reconstructed catch for each maritime area. Over 220 maritime areas to be assessed.

Preliminary results suggest:

- developed countries have 20-100% larger total reconstructed catch compared to FAO reported landings; and
- developing countries have 80-600% larger total reconstructed catch compared to FAO reported landings.

Methodology described in Zeller *et al.* 2007. US Fishery Bulletin

Catch reconstructions:

Best possible **estimate** of total fisheries removals

1. Estimate each sectors catches separately:

- Industrial: reported vs. unreported;
- Small-scale commercial: reported vs. unreported;
- Subsistence: generally unreported;
- Recreational: generally unreported;
- Discards : generally unreported.

2. Assign catches in database to best possible taxonomic level: species or family; Improve taxonomic breakdown of FAO data (where applicable).

3. Data gathered from peer-reviewed literature, local scientific experts, grey literature and anecdotal evidence. Most trusted sources used.

4. Use estimates and extrapolate conservatively.

Zeller *et al.* 2007. Fishery Bulletin 105 (2): 266-277.

Fishing activities which pertain to IUU fishing

- All unreported catches, even if legally fishing;
- Fishing with an unlicensed vessel;
- Fishing in closed areas/seasons;
- Catching prohibited species;
- Using prohibited equipment.

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Methodology- Turkey

Unreported catches

There was consensus between peer-reviewed literature, many fishers, scientists and government that commercial fishers have a tendency to underreport their catches by approximately 30-50%.

Thus, 40% was added to all reported commercial catches from 1950-2010 to adjust for this discrepancy.

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Recreational and subsistence catches

Based on Ünal *et al.* (2010), Characteristics of recreational fishing in the Çannakale strait (Turkey).

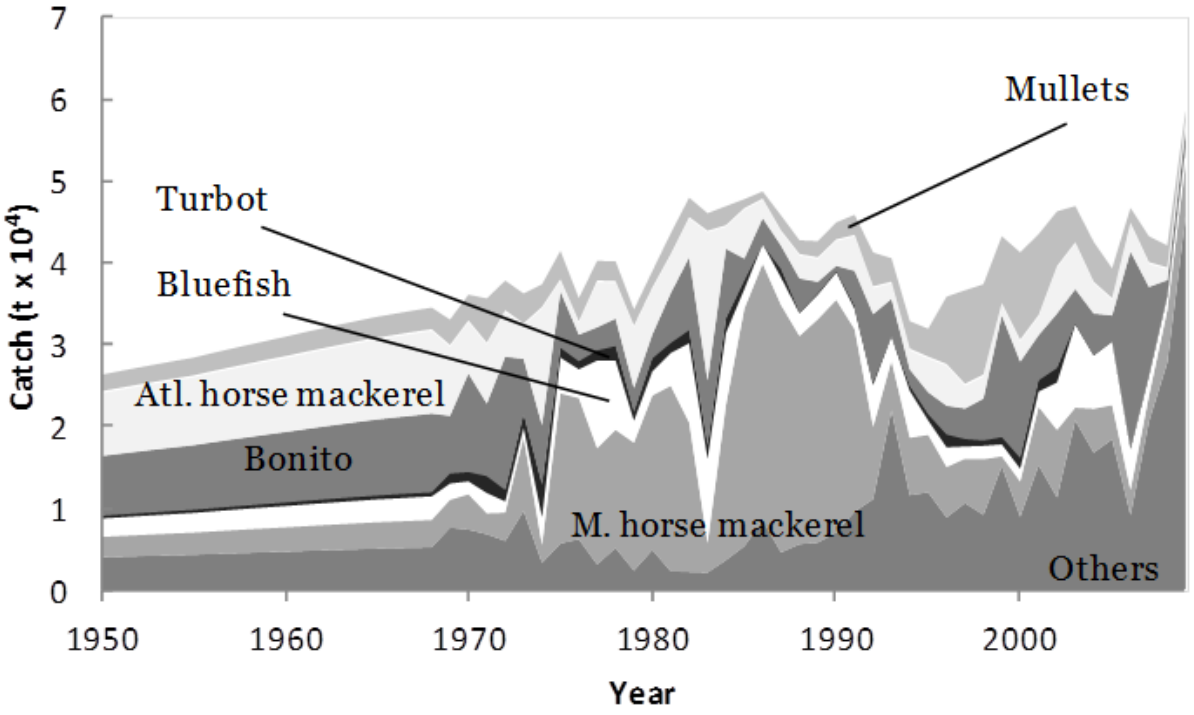
For the Black Sea, we estimated 1% of coastal population to fish either for recreation or subsistence purposes;

Catch rate used was 0.129 t /fisher/ year in 2010, and

0.258 t /fisher/year in 1950 and interpolated for years in between.

Ünal, V., Acarli, D. & Gordoa, A., 2010. Mediterranean Marine Science, 11 (2): 315-330.

Turkish Black Sea, recreational and subsistence catches (all unreported)



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Discards

We calculated three types of discards:

- bottom trawling discards;
- highgrading;
- other discards.

Turkey has reported some discards in their statistics from 1998-2008. The discard rate averaged to be 1.6% for the period, and is likely an underestimate.

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Discards- bottom trawling

From fieldwork on discard rates of the following fisheries in the Black Sea (2004-2006), the following discard percentages were applied to bottom trawling:

Table 2: Discard rates applied to taxa from bottom trawling on the Turkish Black Sea coast, 1950-2010.

Taxon	Discard rate (%)
Whiting (*Merlangius merlangus*)[a]	45.3
Red mullet (*Mullus barbatus*)[a]	25.7
Turbot (*Psetta maxima*)[a]	27.5
Med. horse mackerel (*Trachurus mediterraneus*)[a]	25.8
Atl. Horse mackerel (*Trachurus trachurus*)[a]	22.2
Piked dogfish (*Squalus acanthias*)[a]	16.6
Sea snail (*Rapana venosa*)[b]	11.5

[a)] From Zengin and Knudsen (2006);[b)] From Kelleher, (2005).

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The Most Important Species: Turbot in the Black Sea

- There is a notable decline in reported Turkish turbot catches from the Black Sea starting in 2000.

- It is widely known that Turkish fishers were illegally fishing for turbot in the north-western Black Sea, off of Bulgarian, Romanian and Ukrainian waters (where between one thousand and two thousand t were taken annually) between the years of 1993-2001 and also 2009, until there were some (fatal) accidents between the maritime police and the illegal Turkish fishers.

- The catches were sold on the Turkish market and reported as Turkish catch. Turkish fishers also catch turbot in Abkhazia (former Georgia) (S. Knudsen, pers. obs.). After 2001, Turkish fishers have had to rely exclusively on their own 'narrow and exhausted' Black Sea continental shelf for turbot, hence the reduction of Turkish turbot catches after 2001 (*STCF, Black Sea WG, Annual Stock Assessment Tech. Report, 2010*)

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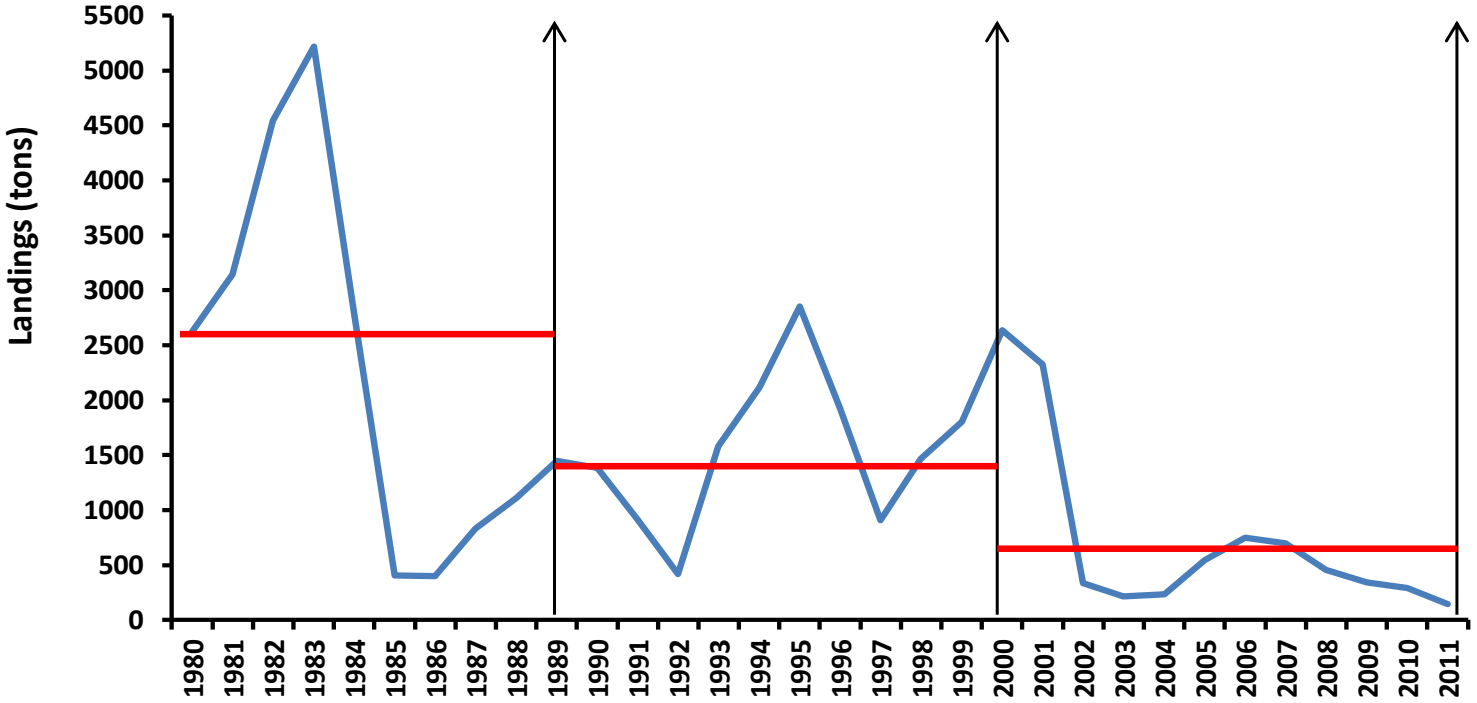
Turbot in the Black Sea



Turkish Black Sea last 30 years turbot landing (red line is showed average of every ten years).

Zengin and Gümüş, STECF Stock Assessment WG, October, 2012, Milan, Tech. Report .

Turbot in the Black Sea

- For each of these ten years, we are adjusting the reported catch data with the minimum estimated amount (1,000 t year $^{-1}$) of turbot catches (since these catches were not caught in Turkish waters), and re-allocating the catches to the countries EEZ's of which they were caught. This equals an adjustment of 10,000 t annually that has been re-allocated equally to the EEZ's of Romania, Bulgaria and the Ukraine. The catches were divided equally between the three countries.

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Discards- highgrading & other discards

Table 5: Discard rates applied to highgrading for all seas, 1950-2010.[a] **(%)**

Taxon	1950-1995	1996-2010
Scorpionfish (Scorpaenidae)	900	200
Goby (Gobiidae)	900	200
Ray (Myliobatoidei)	900	200
Sprat (*Sprattus sprattus*)	900	15

a) From M. Zengin, pers. obs.

- **Highgrading:** discarding of a marketable species to retain the same species at a larger size or higher price, *or* to retain another species of higher value *or* the retention of only those species with the greatest market value (Alverson, 1994);
- Until very recently, some non-target fish species have been almost entirely discarded (Zengin et al., 2004);
- Other discards: took weighted global average discard rate (8%, Kelleher, 2007) and subtracted Turkey's average discard rate (1.6%), then conservatively reduced the rate to 5%, applied to other pelagic BS fisheries.

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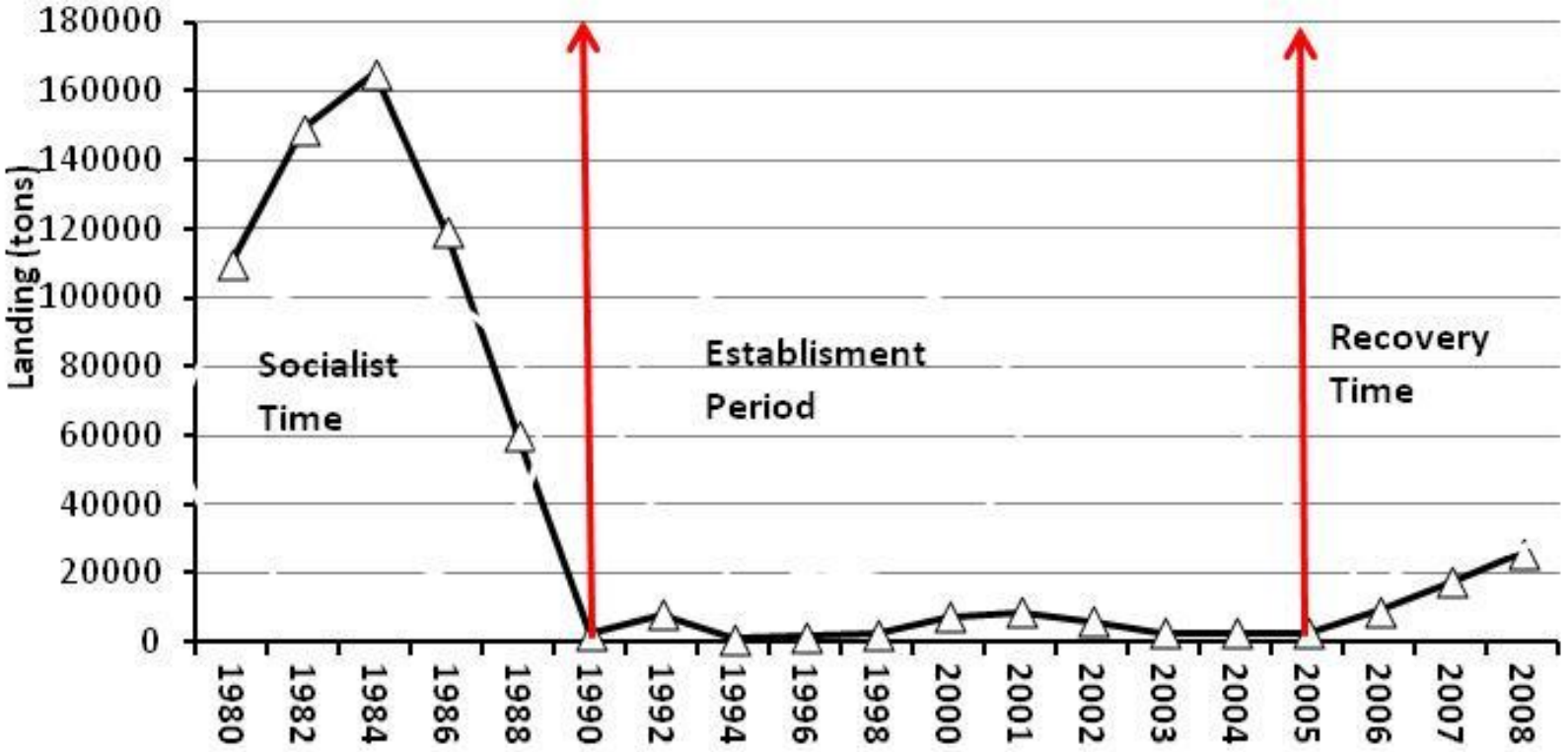
Anchovy Fisheries in the out of Turkish waters

- Turkish purse seiners have fished extensively in Georgian waters for anchovy under private deals between Turkish and Georgian companies since the dissolution of the Soviet Union; This arrangement is not framed by any government bilateral agreement (***Knudsen et al., 2007***).
- Also, contacts within the fish-buying sector suggest that more anchovy is sold through the economy than is recorded in the catch data (***C. Mathews, pers. obs***.), and this amount may total around 50 thousand t year^{-1}, and most likely is not reported.
- Offshore fishing for anchovy likely began after the dissolution of the Soviet Union (1991) in the waters of Abkhazia and Georgia, and some have been reported as Turkish catches. Since this study is concerned with the catches exclusively in Turkish national waters, these distant caught anchovy catches will be deducted from Turkey's catches (***Zengin et al., Yunus Research Bulletin, 2012***).



Georgian anchovy landing last 30 years and its relation to political process …

Zengin et al., Yunus Research Bulletin, 2012.

Anchovy Fisheries in the out of Turkish waters

- **Clue:** A Turkish carrier vessel employee working for a purse-seine boat in Abkhazia personally delivered 23 hundred t of anchovy in just a three month season. There are normally at least two carrier vessels working per purse seiner, and it is thought that approximately 20-50 Turkish purse seiners actively fish in distant waters.
- Turkish authorities consider only anchovy catches landed in the Turkish Black Sea town of Hopa to be caught in foreign waters of Georgia/Abkhazia. Anchovy purse seine employees who regularly fish in foreign waters have confirmed that their anchovy catches are landed in many Turkish Black Sea ports, aside from Hopa, which are then likely unreported (***Zengin et al., 2012).***
- This amount of Turkish anchovy catch in distant waters has not yet been estimated but will be included in the Georgia catch reconstruction (in progress).
- This amount of unreported anchovy catch will likely be approximately 50,000 t - 100,000 t a year since the mid-1990's.

Anchovy Fisheries in the out of Turkish waters

- This is the same stock of anchovy as fished in Turkey, which migrates in a counter-clockwise fashion around the Black Sea. These migrating anchovy are easier to catch once they reach Abkhazia since they form dense shoals there.
- Fishers consider that due to increased fishing effort, these stocks are constantly being chased and pushed eastwards and offshore (out of Turkish waters) faster than before. The fishers are able to find and exploit the entire stock with their ultra-modern fishing technologies, by expanding their fishing range in pursuit of their distribution.

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Results- Turkish Black Sea, 1950-2010.

Total reported landings	13,100,000 t
Total unreported landings	5,100,000 t
Discards:	
Highgrading	617,000 t;
Other discards	552,000 t.
Bottom trawling	485,000 t;
Recreational catches	41,290 t.
Subsistence catches	36,221 t.

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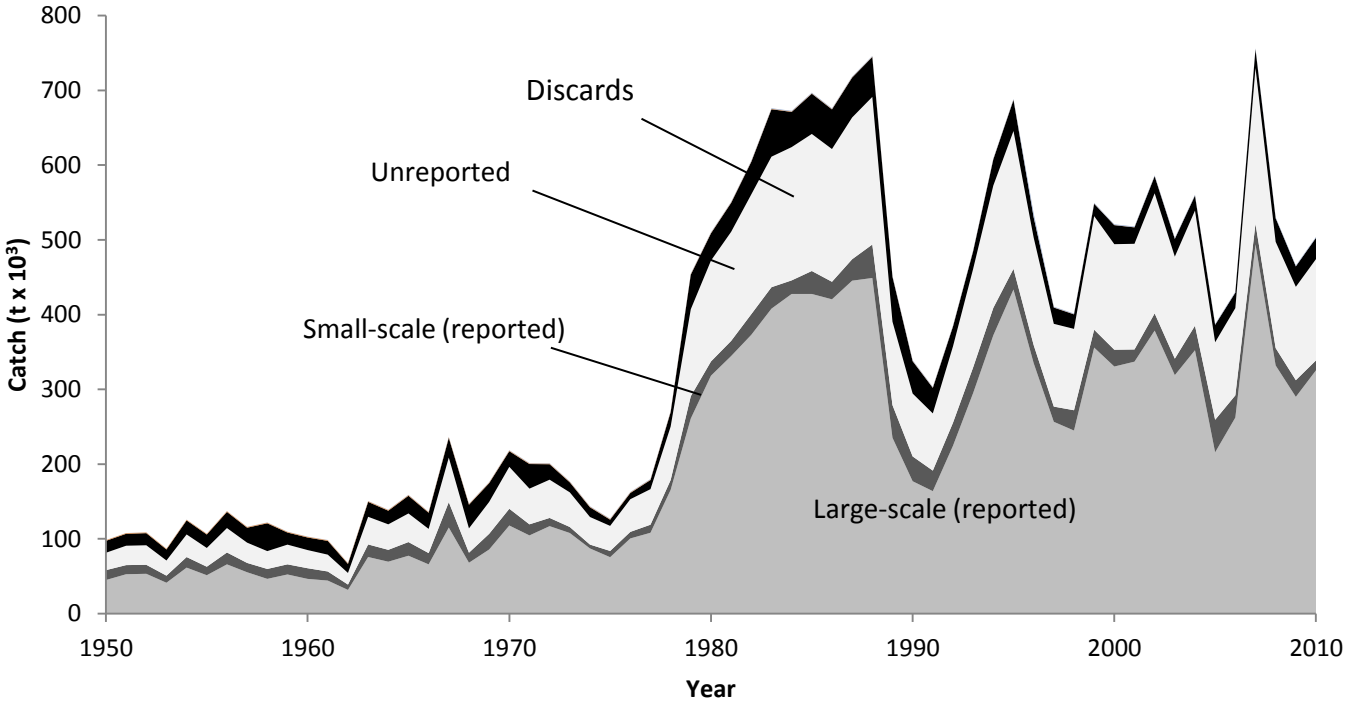
Results- Turkish Black Sea, 1950-2010.



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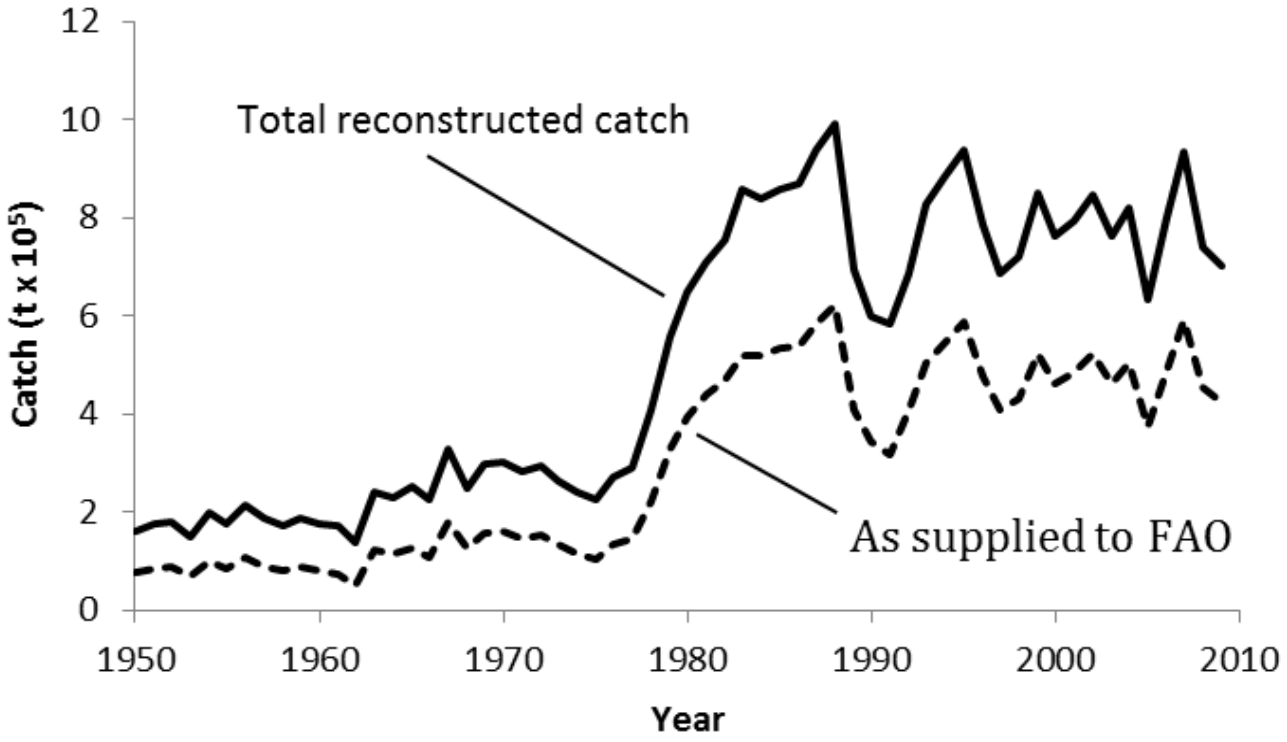
Turkey reconstruction results



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Turkey reconstruction results

The total reconstructed catch for the 1950-2010 time period (inclusive of the reported data) is approximately 31.8 million t. This added 13.7 million t to the reported data, consisting of 7 million t of unreported landings, 3.9 million t of recreational catches, and 2.7 million t of discards.

Accounting for all fisheries components is crucial in understanding the development of fisheries resources, improving management, and reducing threats to the domestic food security of Turkey.

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We also thank Pew Charitable trusts for funding the *Sea Around Us Project*.

Please help the accuracy of our work

Turkey is the only catch reconstruction completed for the Black Sea region. Bulgaria, Romania, Ukraine, Russia and Georgia are currently in progress.

If you can contribute any unreported catches estimates (.e., unreported, recreational and discards) for one of the Black Sea countries, or if you would like to help us verify our estimates, please contact Aylin Ulman at a.ulman@fisheries.ubc.ca

We thank you in advance for your help and expertise!