L. Boitor

INTERNATIONAL PACIFIC HALIBUT COMMISSION

Fully subscribed: evaluating yield trade-offs among sectors utilizing the Pacific halibut resource

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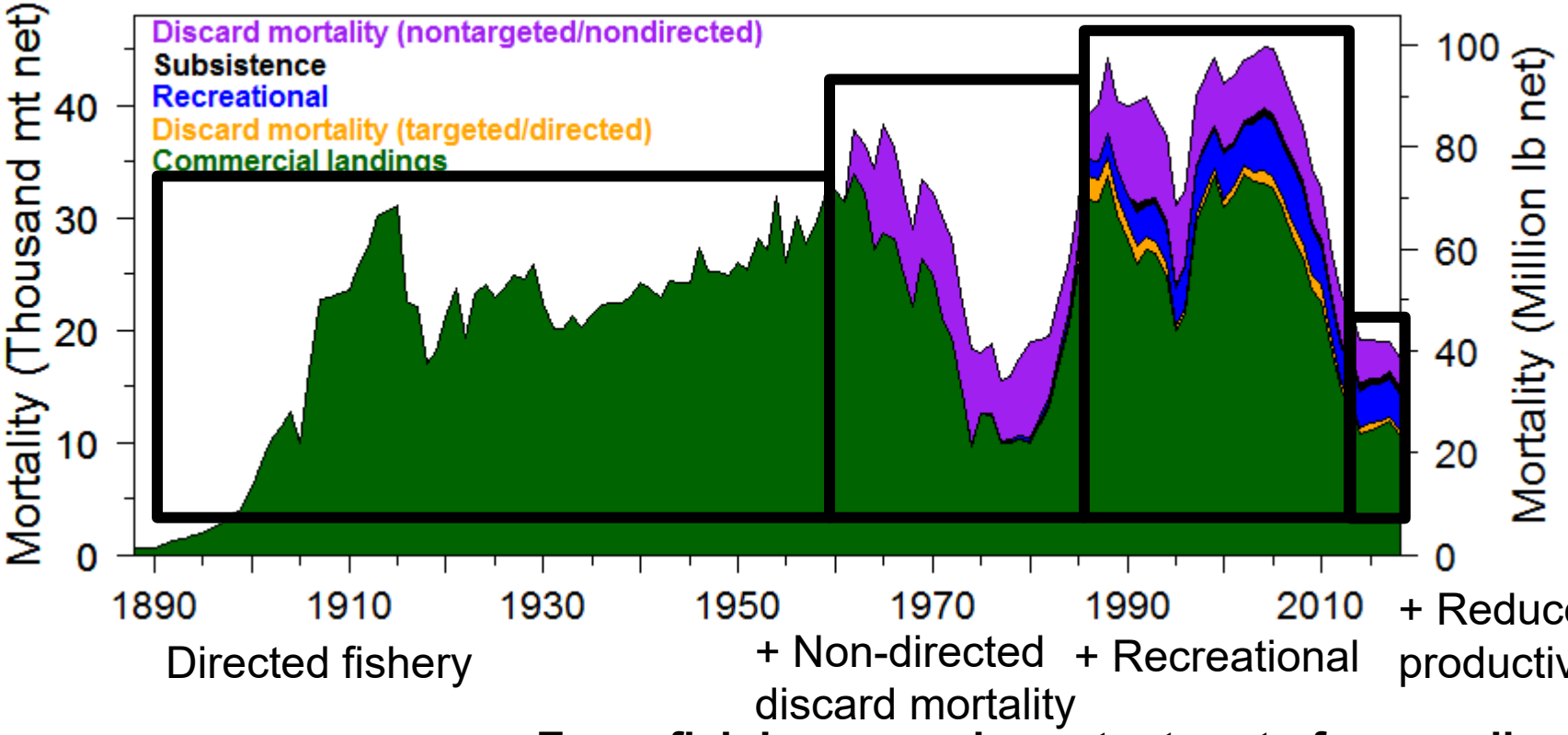
Outline

- History and fishery sectors
- Estimating yield
- Previous studies
- Methods for this study
- Time-series results
- Conclusions

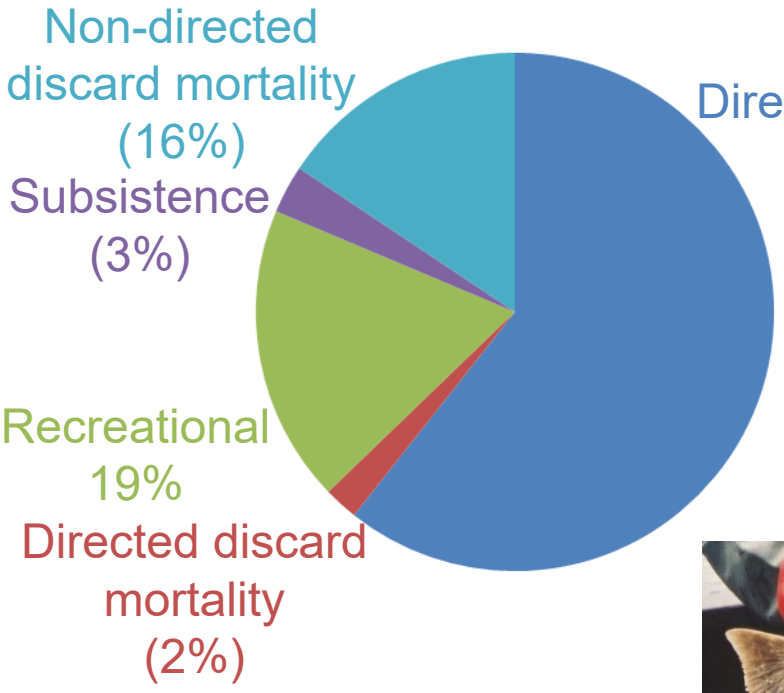
Historical mortality



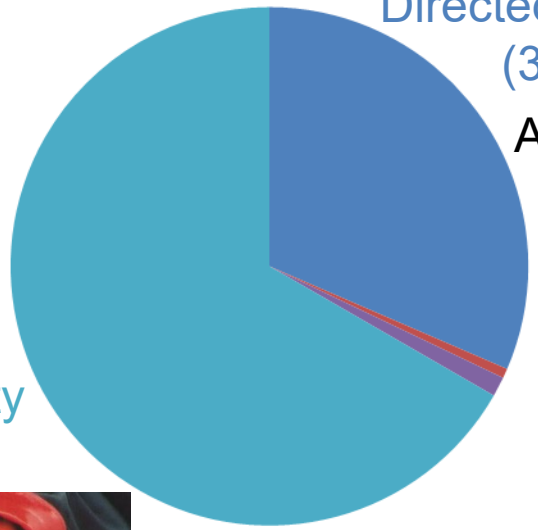
Every fish is now an important part of some allocation

Distribution of recent (2018) yield

Full Convention area (U.S. & Canada)



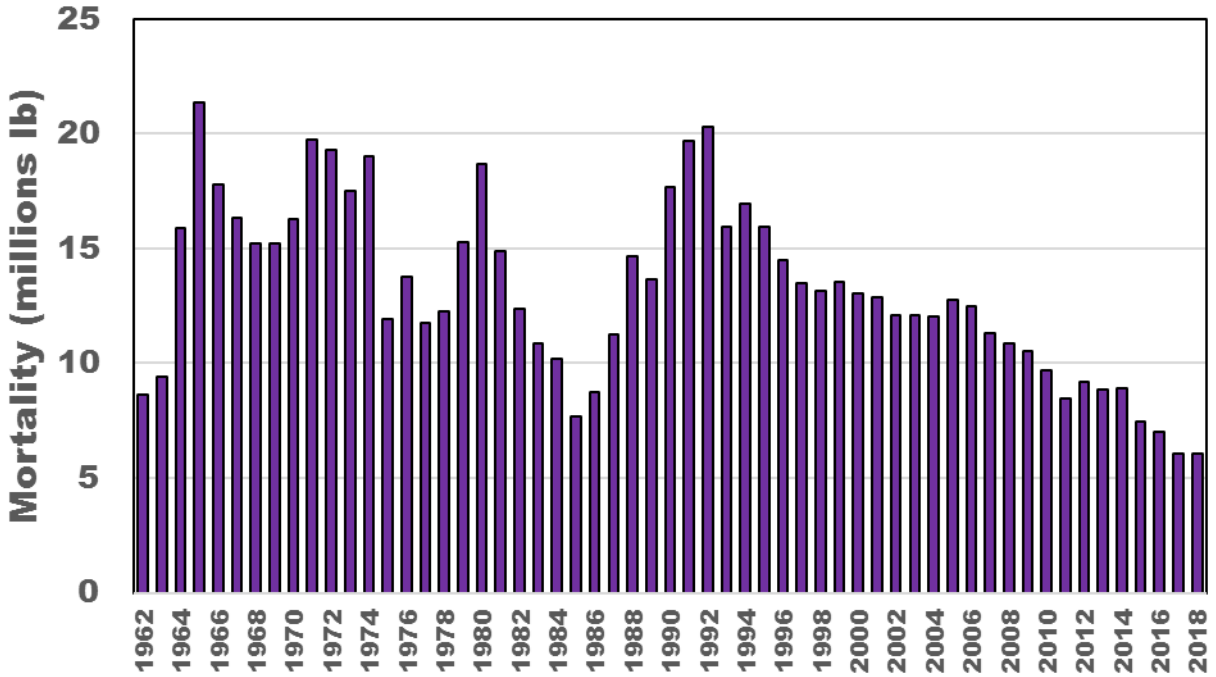
Eastern Bering Sea



Ages 8-16+ mostly females

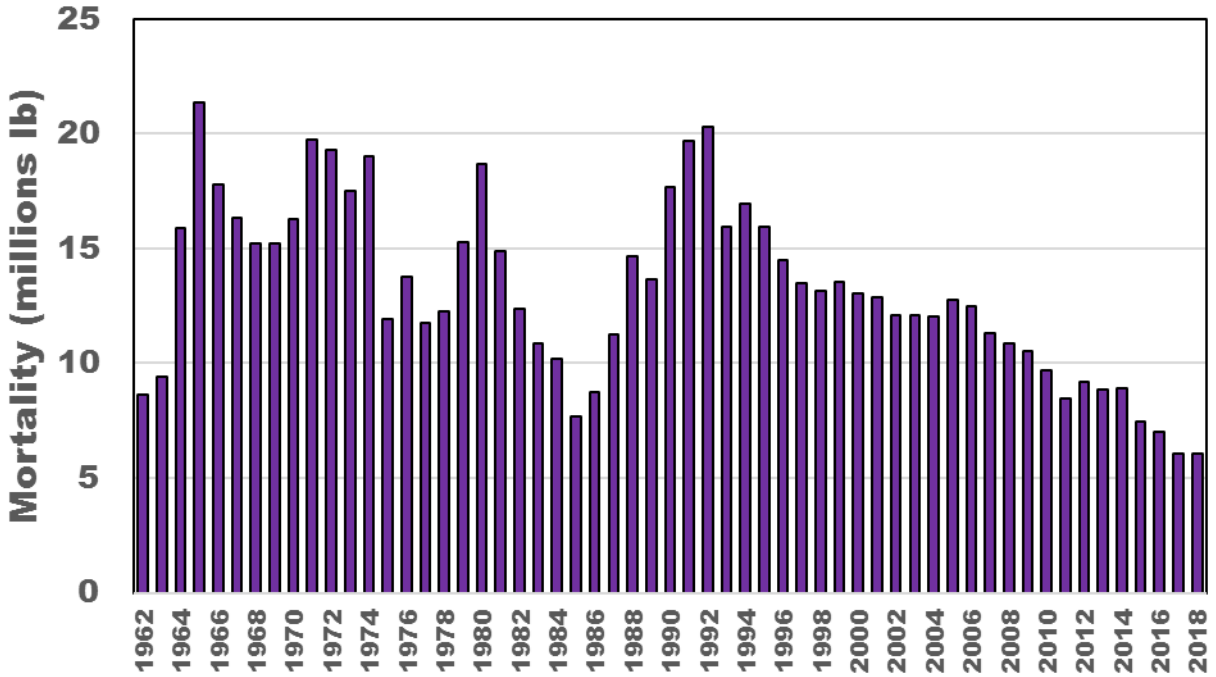
Ages 2-8+

Non-directed discard mortality ('bycatch')



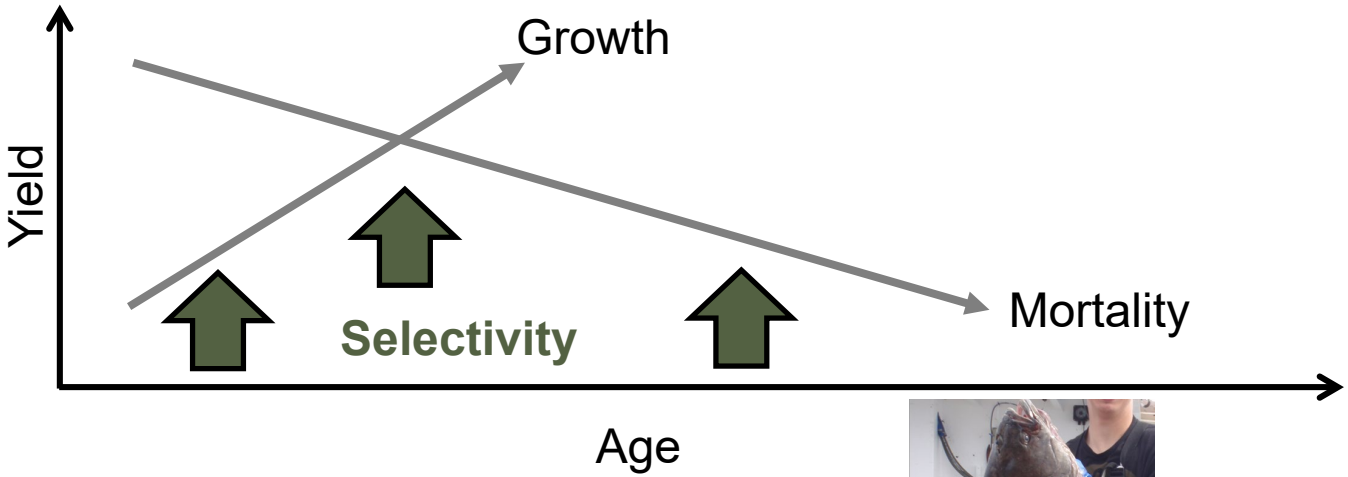
These fish have been discarded (retention is prohibited) and died.

Non-directed discard mortality ('bycatch')



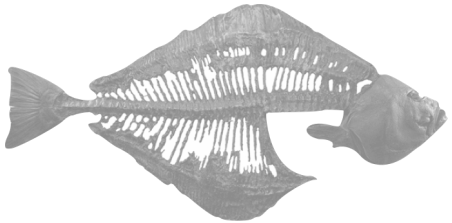
So, how much yield was 'lost' to the directed fisheries?

Measuring yield: Yield-per-recruit

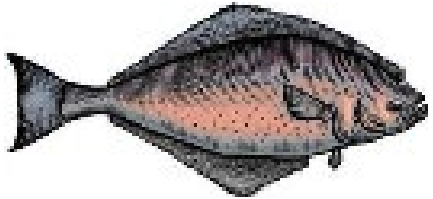


Measuring fishing: Spawning Potential Ratio (SPR - per recruit concept)

Lifetime spawning output:
with fishing



Lifetime spawning output:
without fishing



Important factors

- Biology
  - Growth
  - Mortality
  - Maturity
- Total fishing intensity
- Selectivity of sectors
- Allocation among sectors
- Current age structure

Year-specific conditions!

Previous studies – lost yield

Study	Rate
Adlerstein 1993, 1994	1.0-3.3 (Gear and season specific)
Sullivan et al. 1994	1.7
Clark and Hare 1998	1.12 for 1995
Hare and Clark 2007	1.40, 1.58
Hare and Williams 2013	1.14
IPHC-2019-AM095-INF07,INF08	1.25-1.29 (projected for 2019-2021)

Pessimism or optimism?

- Pounds for pounds
  - Is it ‘lost yield’ or ‘potential yield gain’?

Methods

- For each year (one at a time):
  - Remove the non-directed discard mortality
  - Adjust the directed fishery catch until the SPR matches the original estimate
  - Compare the new potential yield to what was removed

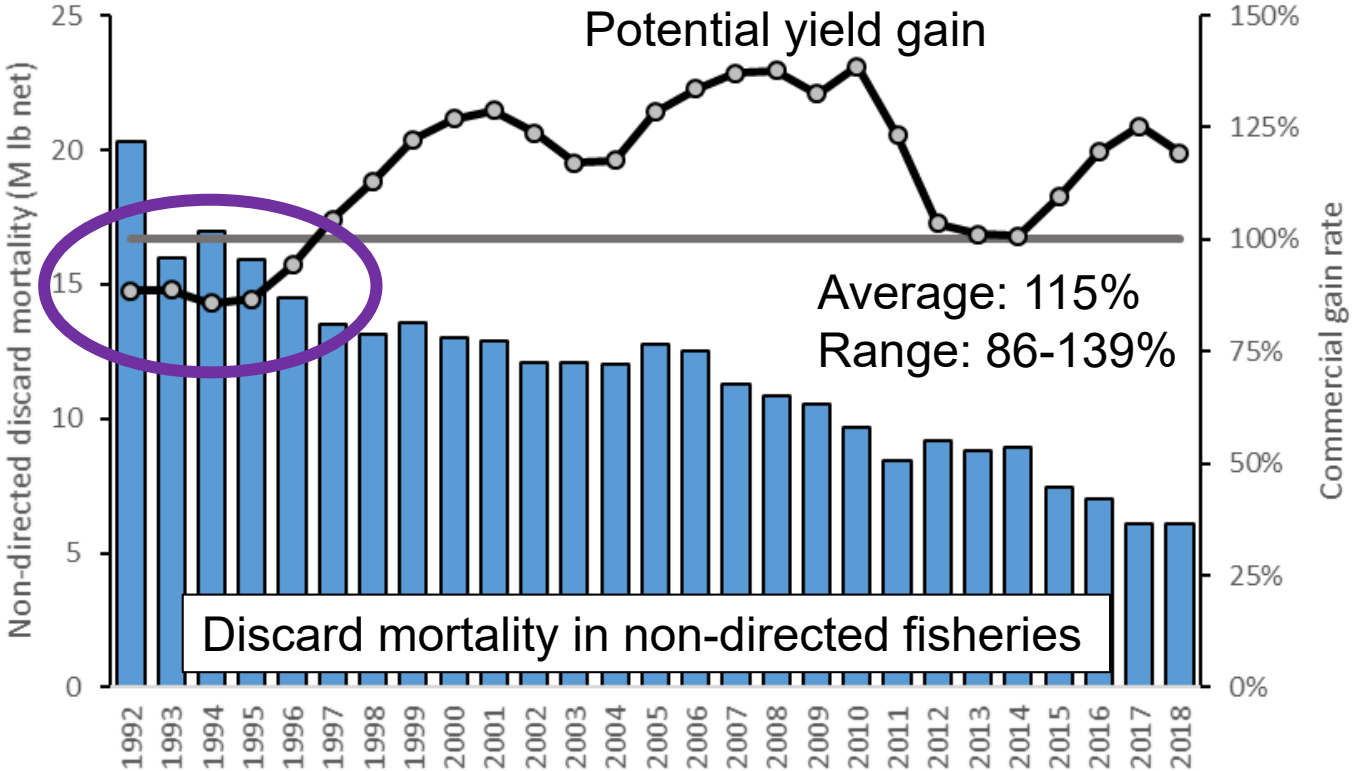
(Sounds easy, but this is an iterative numerical approach using four stock assessment models)

Results: time-series

Lower fishing Intensity

Faster growth

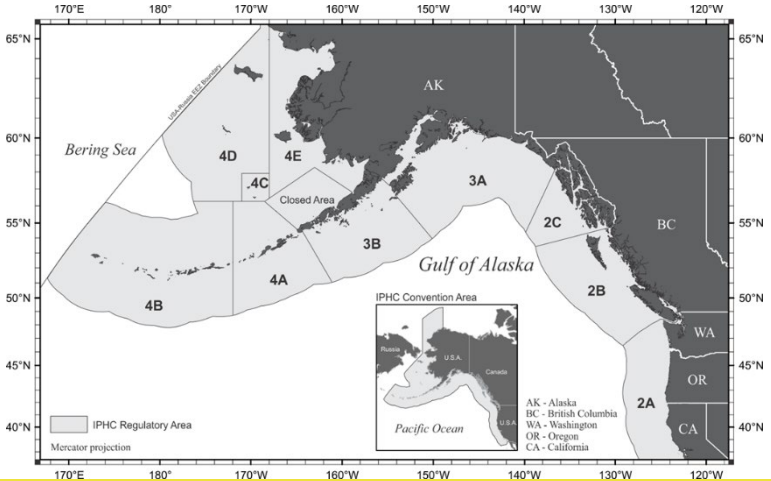
Very large 1987 cohort



Results: distribution

- Movement spreads the effects across the stock

	2A	2B	2C	3A	3B	4A	4B	4CDE
Non-directed discard mortality	3.7%	3.7%	1.3%	22.8%	11.1%	12.4%	5.3%	39.7%
Potential yield gain	3.7%	8.7%	5.4%	28.0%	13.5%	8.4%	5.7%	26.4%



Conclusions

- Mortality of younger fish generally equates to a potential yield gain greater than 100%; **but**,
- There is no constant ‘exchange rate’
- Results may seem counter-intuitive under some conditions (<100%)
- Using SPR (the ‘Fisheries footprint’) is a useful approach for this type of comparison

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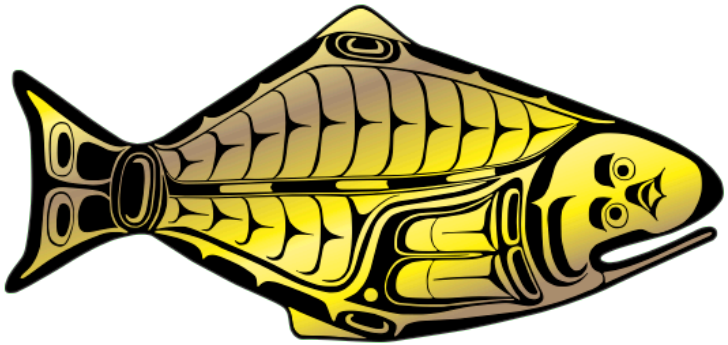

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