



Bootstrap Analysis of Drift Gillnet Fishery Operation under Hard Caps

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Motivation

- The Council asked the HMSMT to consider hard caps in the drift gillnet (DGN) fishery for ESA-listed protected species
- A simulation method has been developed to analyze hard cap alternatives
- **Objectives:**
 - Use recent DGN effort, observed ESA bycatch, retained finfish catch, prices and costs data to simulate the operation of the DGN fishery under hard caps
 - Gauge conservation and economic risks under alternative scenarios



Objectives and Tradeoffs

1. A choice between alternatives will presumably consider tradeoffs between bycatch and economic risk
2. More restrictive caps increase economic risk, due to the heightened chance of reaching a cap early
3. A choice could potentially reflect which alternative poses the least economic risk while meeting requirements under applicable conservation law (ESA, MMPA, MSA, etc.)



Scope of Analysis

- Compare active fleet size limitation to hard caps
- Gauge bycatch reduction versus potential profitability
- Caps under different levels of observer coverage
- Single-year versus multi-year caps



Data Sources

- CDFW logbook data from 2001-2012 for numbers of sets fished per vessel over recent seasons
- Set-level DGN observer finfish and bycatch species counts since the 2001 time/area closure went into effect
- California Fisheries Information System landings database for revenues and weights per fish of market species
- SWFSC cost and earnings survey data to estimate average variable cost per set and average fixed cost per season



Simulation method

- Stratified bootstrap simulation across effort and hard cap management scenarios
 - Resample from logbook effort distribution (2001-2012)
 - Resample from observer records on marketable and protected species interactions
 - Use cost and revenue data to produce profitability measures



Test Case (1)

- Tested method using June 2014 Council-proposed hard caps for high priority protected species:

Whales

1 fin
1 humpback
2 sperm

Turtles

2 leatherback
2 loggerhead
1 olive ridley

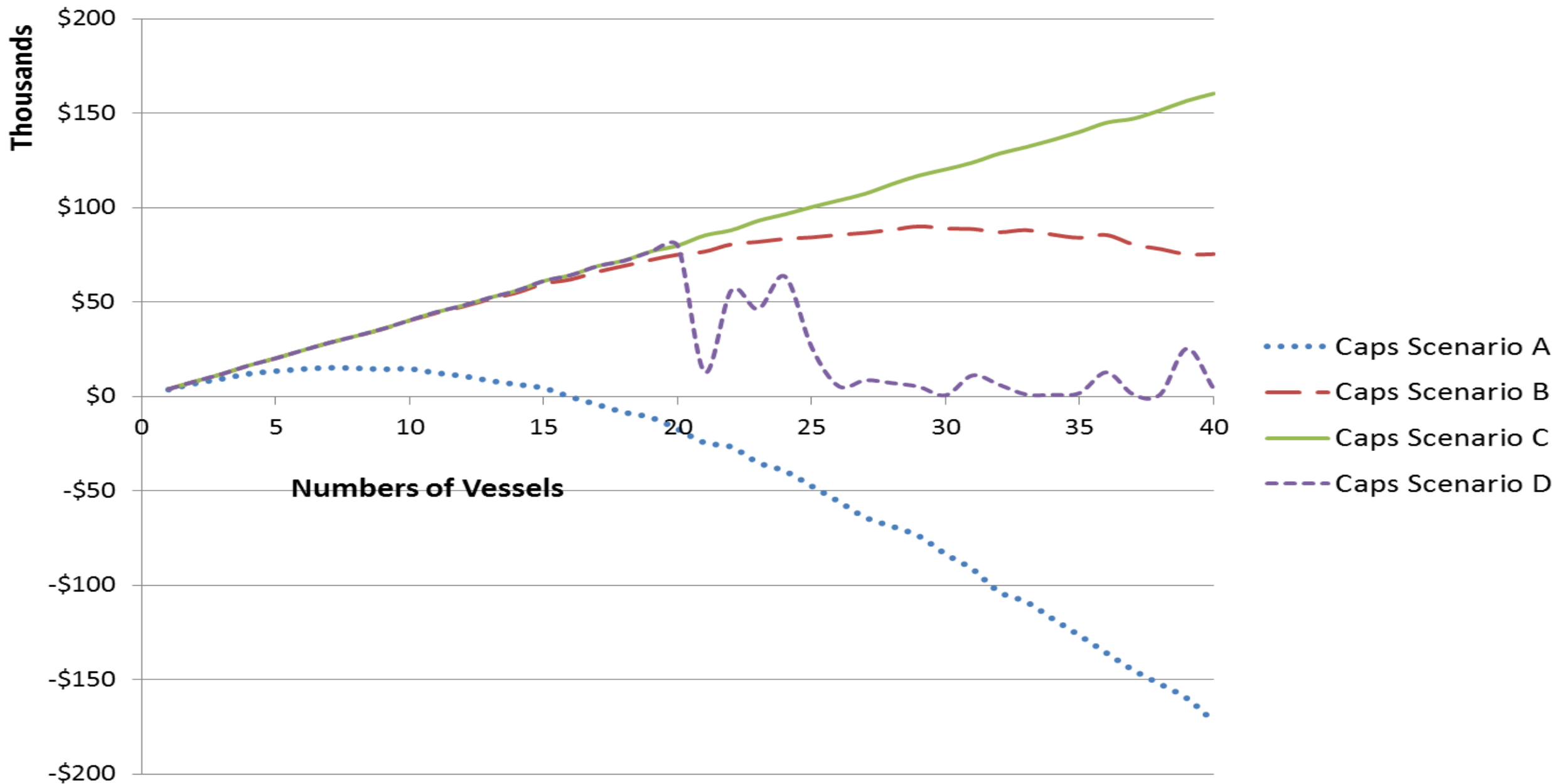
- Assumed a cap of 1 green sea turtle



Test Case (2)

- Varied fleet size from 1- 40 vessels
- Simulated 10,000 seasons for each scenario and fleet size
- Compared 100% observer coverage to lower rate (30%)

Simulated Average Fleet Profitability under Alternative Caps Scenarios





Comments and Preliminary Findings (1)

- Results are based on observed takes, not mortalities; conservative with respect to mortality impacts
- Hard caps w/100% coverage offer certain limits on bycatch
- Unclear whether hard caps significantly improve conservation benefits over a simple limit on active permits



Comments and Preliminary Findings (2)

- Multi-year rolling or rollover caps may work better for rare-event bycatch to balance conservation needs, management flexibility, and economic viability of the fishery
- Overly restrictive hard caps may severely limit effort, reducing the economic viability of drift gillnet fishing



Next Steps

- The bootstrap simulation method is under review by various NMFS economists and biologists
- This method can be used to analyze bycatch and economic risk tradeoffs
- Analysis method and results would be subject to peer review (e.g. SSC review at a future meeting)



Summary

1. The proposed analysis simulates the operation of the DGN fishery under hard cap alternatives
2. The method uses data from recent DGN fishery experience to gauge bycatch and economic risks
3. Preliminary findings for a fleet of 20 vessels indicate small differences in bycatch risk and large differences in economic risks across caps alternatives