

Summary of the 2005 Pacific halibut stock assessment

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Abstract

This year's assessment uses the same methods as last year's to estimate exploitable biomass in all areas except Area 4CDE, where an estimate based on the NMFS trawl survey is reported for the first time. The new estimate is the same as what the old estimation method would have produced. Coastwide exploitable biomass is little changed. Fishery CEY in Areas 4B and 4CDE is lower because of the adoption of a lower harvest rate in those areas.

Introduction

Each year the IPHC staff assesses the abundance and potential yield of Pacific halibut using all available data from the commercial fishery and scientific surveys (Appendix A). Exploitable biomass in each of IPHC regulatory areas 2B, 2C, 3A, 3B, 4A, and 4B is estimated by fitting a detailed population model to the data from that area, going back to 1974 in the eastern areas and to 1996 in Areas 3B and 4. Exploitable biomass in Area 2A is estimated by applying a survey-based estimate of relative abundance to the analytical estimate of biomass in Area 2B. In Area 4CDE the estimate of exploitable biomass is based on the NMFS trawl survey of the eastern Bering Sea shelf.

A biological target level for total removals is calculated by applying a fixed harvest rate to the estimate of exploitable biomass. This target level is called the "constant exploitation yield" or CEY for that area in the coming year. The corresponding target level for catches in directed fisheries subject to allocation is called the fishery CEY. It comprises the commercial setline catch in all areas plus the sport catch in Areas 2A and 2B. It is calculated by subtracting from the total CEY an estimate of all unallocated removals—bycatch of legal-sized fish, wastage of legal-sized fish in the halibut fishery, fish taken for personal use, and sport catch except in Areas 2A and 2B.

Staff recommendations for catch limits in each area are based on the estimates of fishery CEY but may be higher or lower depending on a number of statistical, biological, and policy considerations. Similarly, the Commission's final quota decisions are based on the staff's recommendations but may be higher or lower.

Estimates of exploitable biomass and CEY

Like last year, the model fits in Areas 2B-4B are quite satisfactory (Fig. 1), and the estimates of abundance are little changed in most areas (text table below). The Area 2C estimate is down by about 10% because of a lower commercial CPUE in 2005 and another low survey CPUE in 2005 following last year's 20% drop. The continued decline of both commercial and survey CPUE in Area 3B in 2005 resulted in a substantial downward revision of estimated biomass at the beginning of 2005, from 56 million pounds in last year's assessment to 40 million in this year's. Estimated biomass at the beginning of 2006 in this year's assessment is higher (45 million) because of strong estimated incoming recruitment.

	2005 biomass 2004 assessment	2005 biomass 2005 assessment	2006 biomass 2005 assessment
Area 2A	7.0	7.5	7.6
Area 2B	58	60	61
Area 2C	66	60	61
Area 3A	146	150	143
Area 3B	56	40	45
Area 4A	20	20	19
Area 4B	10	11	9
Area 4CDE			
Analytical	32	---	---
Trawl survey	---	36	36
Total	395	385	382

Exploitable biomass in Area 2A is calculated as a proportion of the Area 2B analytical estimate. The proportion used is the ratio of survey CPUE's (three-year running mean) weighted by bottom areas:

$$\text{proportion} = \frac{(2A \text{ CPUE}) \times (2A \text{ bottom area})}{(2B \text{ CPUE}) \times (2B \text{ bottom area})}$$

The idea here is that survey CPUE is an index of density and multiplying it by the total bottom area gives an index of total biomass. The calculated value of the scaling proportion has been 12% or 13% for the last three years, with the alternation between the two adding to the variability of the Area 2A estimate. A working value of 12.5% was adopted this year, with the aim of sticking with it unless and until the calculated value moves very far in either direction.

In last year's assessment, the estimate of biomass in Area 4CDE was calculated by scaling the Area 4A analytical estimate by the same procedure. But lacking setline survey data from the large eastern Bering Sea shelf, the calculation used an assumed setline survey CPUE of 40 lb/skate in all of Area 4CDE, based NMFS trawl survey catch rates and a comparison of trawl and setline survey catch rates at a limited number of stations in Areas 4A and 4C in the mid-1990s. Using this procedure, the estimated biomass in Area 4CDE in last year's assessment was 160% of the Area 4A estimate or 32 million pounds. Because survey CPUE in Area 4A continued to decline in 2005, this year's scaling factor would be 190% and the Area 4CDE estimate would be 36 million pounds. The value shown in the table above is the same, but it is based directly on the most recent NMFS trawl survey results.

Total CEY (Table 1) is calculated by applying a harvest rate of 22.5% in Areas 2A, 2B, 2C, and 3A, 20% in Areas 3B and 4A, and 15% in Areas 4B and 4CDE. These are the same rates used last year except in Areas 4B and 4CDE, where the rate has been reduced from 20% to 15% (Hare 2006).

Table 1. Estimates of exploitable biomass and CEY.

	Area 2A	Area 2B	Area 2C	Area 3A	Area 3B	Area 4A	Area 4B	Area 4CDE	Total
2005 catch limit ¹	1.33	13.25	10.93	25.47	13.15	3.44	2.26	3.99	73.82
2005 exploitable biomass (2004 assessment)	7.0	58	66	146	56	20	10	32	395
2006 exploitable biomass (2005 assessment)	7.6 ²	61	61	143	45	19	9	36 ³	382
Other removals									
Sport catch	0.49	1.46	2.54	5.44	0.01	0.04	0.00	0.00	9.98
Legal-sized bycatch	0.17	0.19	0.14	1.32	0.36	0.46	0.28	2.21	5.13
Personal use	0.04	0.30	0.68	0.40	0.03	0.03	0.00	0.07	1.55
Legal-sized wastage	0.01	0.04	0.04	0.08	0.03	0.02	0.00	0.01	0.23
Total	0.71	1.99	3.40	7.24	0.43	0.55	0.28	2.29	16.89
...excluding sport catch	0.22	0.53	---	---	---	---	---	---	
Total CEY ⁴	1.71	13.73	13.73	32.18	9.00	3.80	1.35	5.40	80.90
Fishery CEY ¹	1.49	13.20	10.33	24.94	8.57	3.25	1.07	3.11	65.96

Notes:

1. 2005 catch limit and 2006 fishery CEY include sport catch in Areas 2A and 2B.
2. Area 2A exploitable biomass estimated as 12.5% of Area 2B (12% last year).
3. Area 4CDE exploitable biomass estimate based on NMFS trawl survey for the first time.
4. Total CEY is 22.5% of exploitable biomass in Areas 2A, 2B, 2C, and 3A; 20% in Areas 3B and 4A; 15% in Areas 4B and 4CDE.

Features of the 2005 assessment in Area 2B

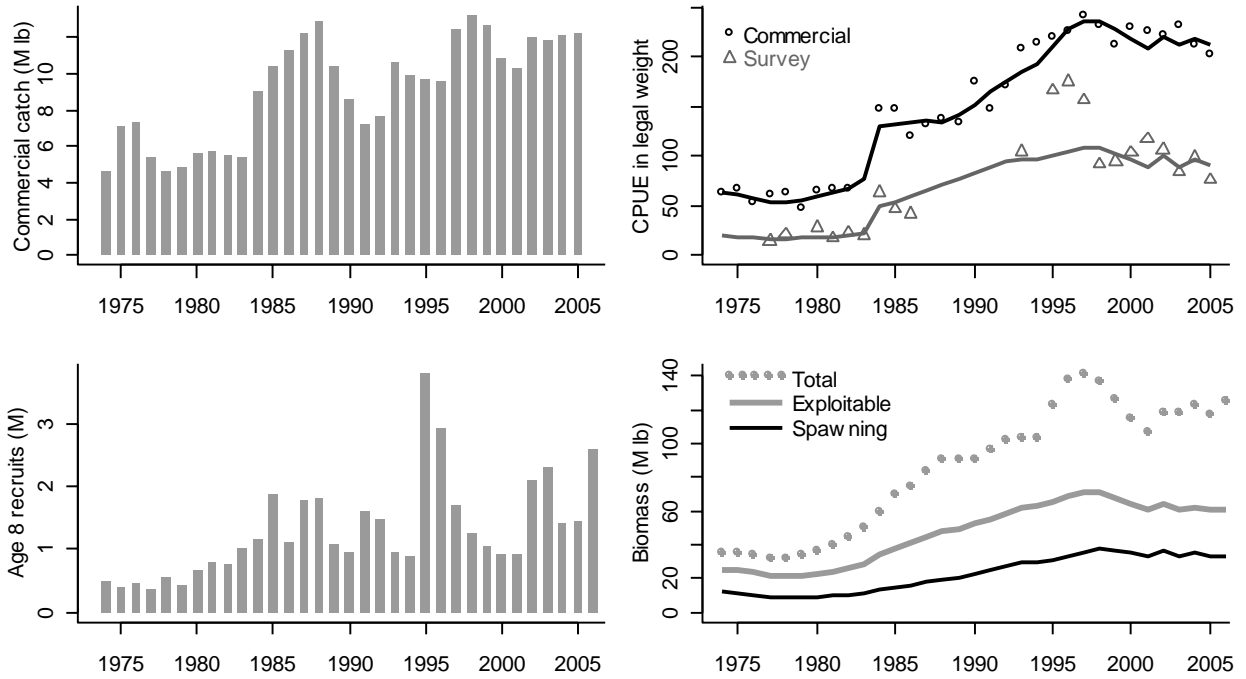


Figure 1a. Features of the 2005 assessment in Area 2B.

Features of the 2005 assessment in Area 2C

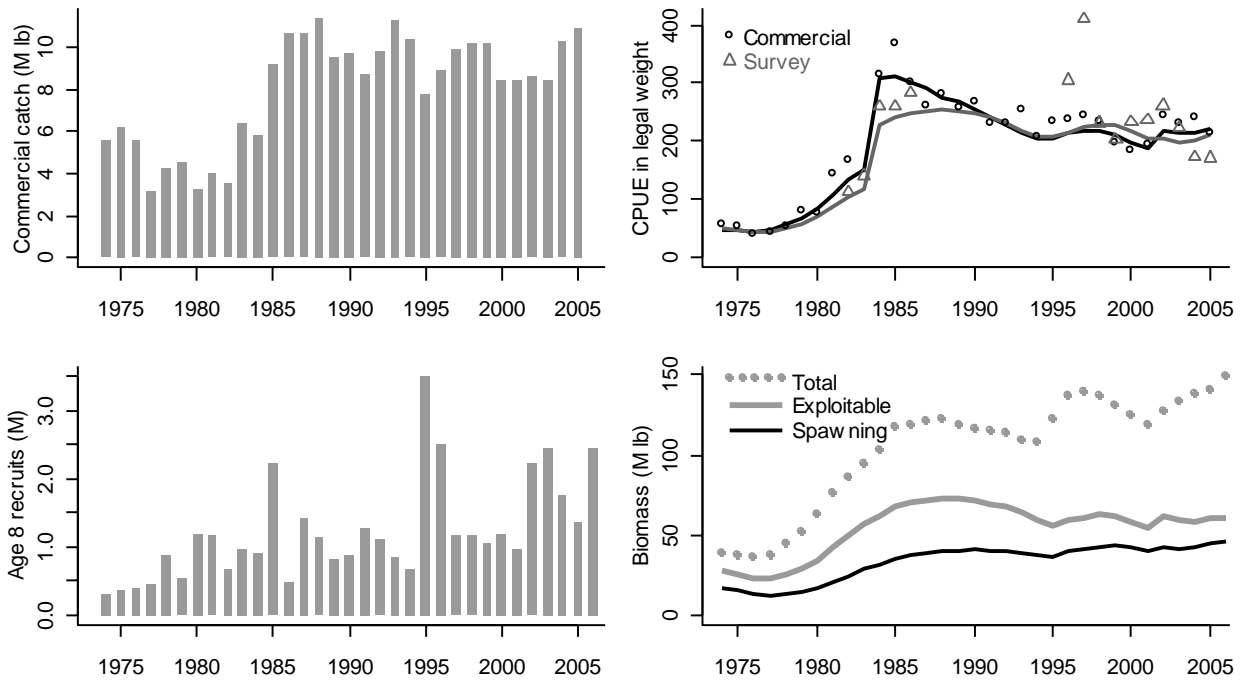


Figure 1b. Features of the 2005 assessment in Area 2C.

Features of the 2005 assessment in Area 3A

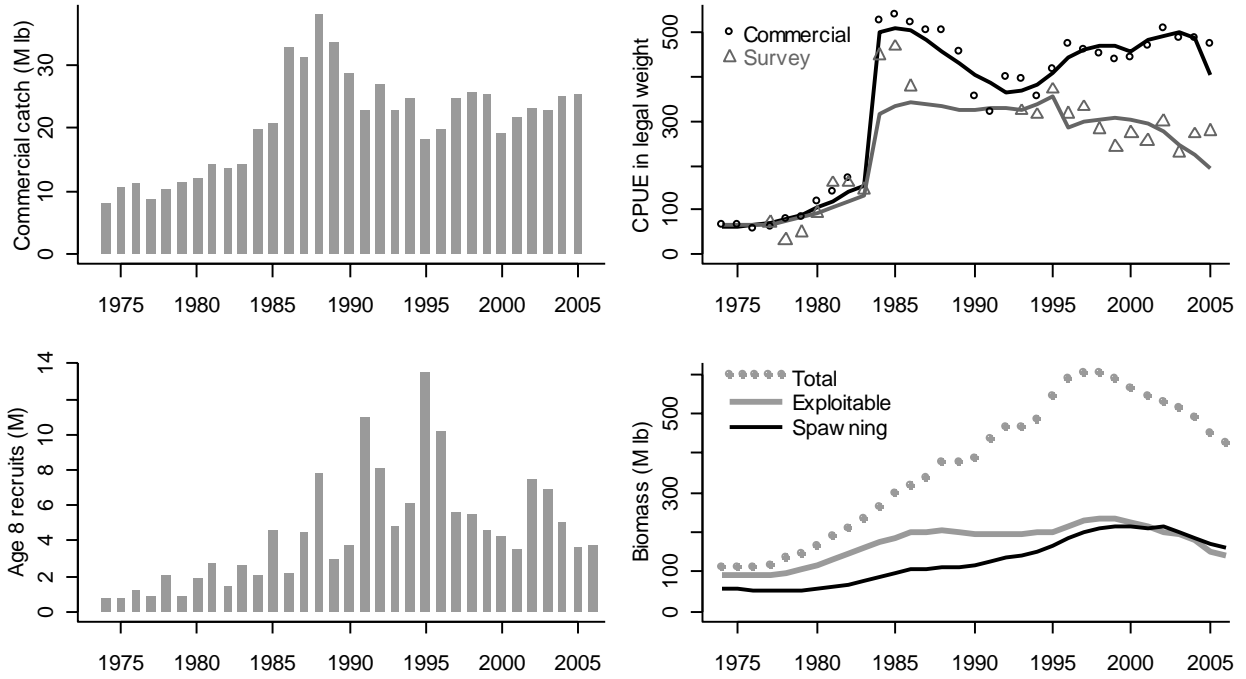


Figure 1c. Features of the 2005 assessment in Area 3A.

Features of the 2005 assessment in Area 3B

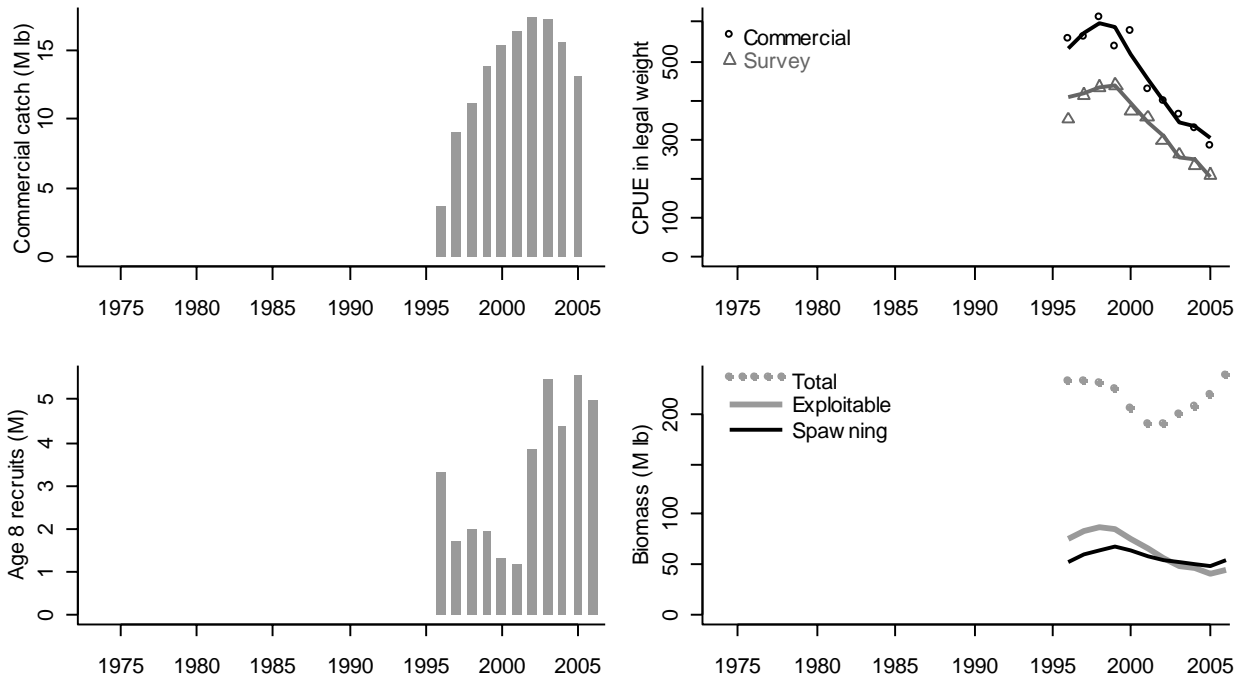


Figure 1d. Features of the 2005 assessment in Area 3B.

Features of the 2005 assessment in Area 4A

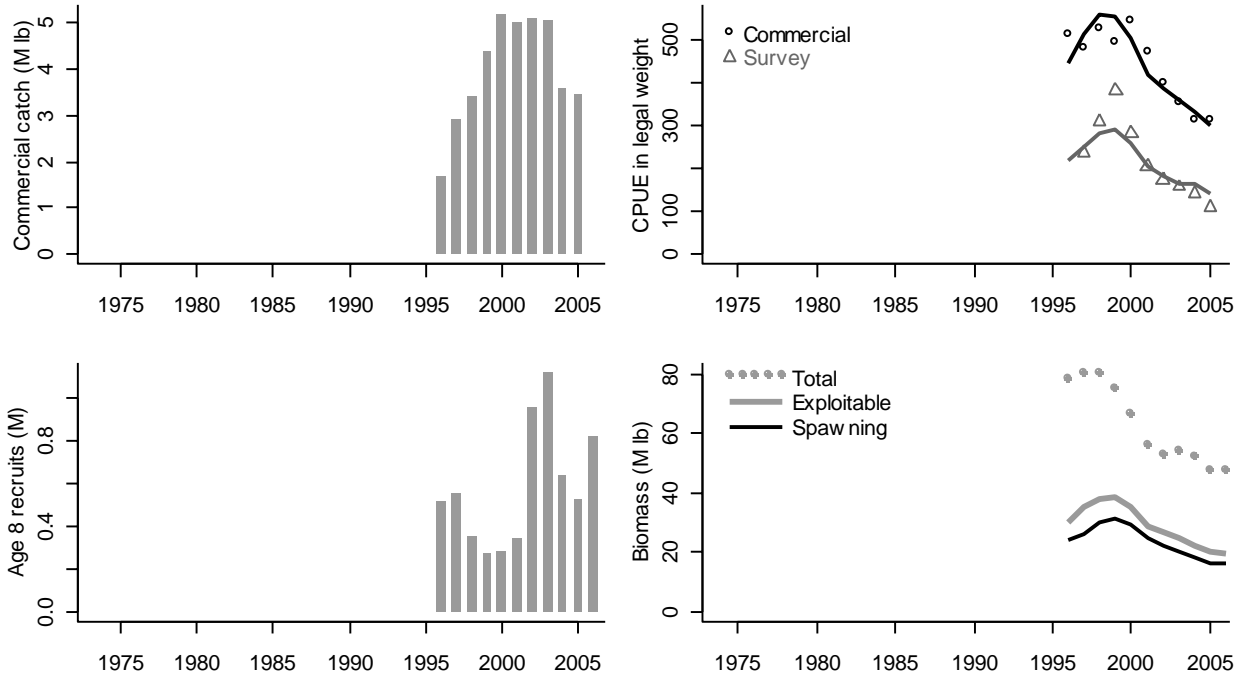


Figure 1e. Features of the 2005 assessment in Area 4A.

Features of the 2005 assessment in Area 4B

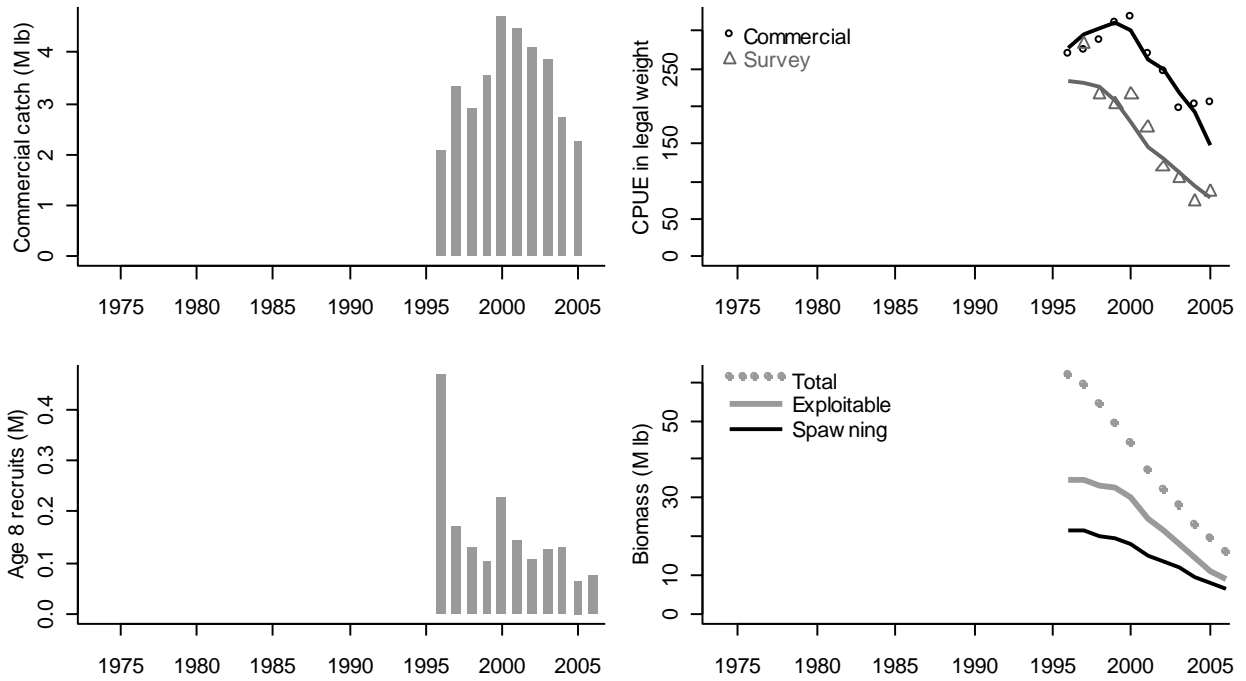


Figure 1f. Features of the 2005 assessment in Area 4B.