

IPHC Staff regulatory proposals: 2010

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Introduction

In making catch limit recommendations for 2010, staff has considered the results of the 2009 stock assessment, changes in the commercial and survey indices used to monitor the stock, and a harvest policy that reflects coastwide policy goals. The staff also drew on the outcome of both the April 2009 Biomass Apportionment Workshop and discussions on the IPHC online Discussion Forum developed for the workshop. Detailed results of these and other additional investigations are reported in the 2009 Report of Assessment and Research Activities.

Coastwide commercial fishery weight per unit effort (WPUE) decreased by approximately 3% in 2009 from 2008 values, primarily due to declines in the central portion of the stock (Areas 3A, 3B, and 2C). However, commercial WPUE in the more extreme portions of the stock distribution generally improved during 2009, with Areas 2A, 2B, and 4A increasing substantially. The 2009 IPHC stock assessment survey WPUE values increased in Areas 2B, 2C, and Area 4 but decreased in Areas 2A, 3A, and 3B. The coastwide survey WPUE index declined by approximately 7% from 2008 to 2009. This year's stock assessment revises last year's estimate of 2009 biomass downwards by about 10% but projects an increase in the 2010 exploitable biomass of about 14%.

Biomass apportionment among regulatory areas

The second Biomass Apportionment Workshop conducted in April 2009 resulted in a number of suggestions for alternative methods of apportioning the coastwide biomass to the staff's preferred option of using the IPHC survey data as the basis for apportionment. The suggested options for apportionment were further refined through discussions between the staff and the Commissioners in September and November 2009. Accordingly, the staff examined the use of three adjustment factors, two methods of weighting recent year's survey data, and the combination of survey data with fixed regulatory area historical catch (total removals) shares. In detail, this resulted in the following potential adjustments to the basic survey data-based apportionment:

Adjustment factors	Time weighting	Data combinations
Hook competition	3-yr simple average (1:1:1)	Survey data alone
Depth stratification	3-yr reverse weighted	Survey:15-yr removal share
Timing of the survey	average (2:2:1)	(2:1 ratio)

The staff examined the rationale for each of these suggested options and evaluated their potential use in the apportionment process.

Adjustment factors

1. Hook competition. The hook competition adjustment factor attempts to accommodate regional differences in competition for baits during survey fishing, arising from other species taking the baits and making them unavailable to halibut. This hook competition can affect the relative catchability of halibut among areas but the identity of the species taking the baits does

not need to be taken into account, simply that the baits are unavailable to halibut. Given that the apportionment process assumes equal survey catchability among areas, it is reasonable to attempt to correct for any regional differences in competition that might affect this catchability. The methodology for calculating the level of hook competition was presented in Clark (2008) and involves estimating the rate of removal of baits, the catch rate of halibut and the number of baits remaining when the survey gear is hauled. Sampling of the returning survey fishing gear at each station and summarizing over regulatory areas allows estimation of hook competition and its effect on estimation of halibut density.

Areas where the number of baits returning is greater than the coastwide average have higher catchability while areas with fewer baits returning have lower catchability. A hook adjustment factor is computed by dividing the coastwide value of average baits returned by the area-specific value of average baits returned. Adjustment factors are greater than one for areas with lower catchability (survey WPUE is adjusted upward) while higher catchability results in adjustment factors lower than one. Examining survey data and averaging over the 2007-2009 period shows that Area 2A has had lower catchability while Areas 4B and 4D have had higher catchability. However, for the majority of regulatory areas there is no significant difference in the hook adjustment factor, hence in estimated catchability.

2. **Survey timing.** The second Biomass Apportionment Workshop raised the issue that, in some regulatory areas, the IPHC survey may occur either before or after a significant proportion of the annual removals is taken by the various fisheries. Since the survey is designed to measure relative density among areas, it should in theory be measuring density when similar proportions of the annual removals have occurred. This is a reasonable concern and it presents a sensible rationale for adjustment. Accordingly, the staff has developed a method to adjust the survey catch rates to account for differences in survey timing. In essence, the method estimates the harvest rate on the exploitable biomass in each area and adjusts the survey catch rate to that which would be expected if 50% of the annual removals were taken prior to the mean survey date. If the harvest rates were equal in all areas, then the proportion of annual removals taken before the survey mean date could be used as an adjustment factor. But since harvest rates are not equal among areas, the estimation must be based on the realized harvest rate of the biomass in each area.
3. **Depth stratification.** The depth distribution of survey stations is based on a systematic geographic grid so it generally mirrors the depth distribution of the bottom for each regulatory area. However, the match is not perfect as the survey was not designed specifically to match depth distribution. Station distributions in Areas 2A, 4A, and 4B are less coherent with bottom depth than other areas. In the 2009 assessment, analysis showed that in all areas, the depth stratified mean survey catch rates were not significantly different from unstratified catch rates. Additional considerations are that post-stratification of data from the survey is statistically questionable because the IPHC survey was not designed as a depth-stratified survey, and that the conclusions from post-stratification are sensitive to definition of strata and number of observations.

Time weighting

1. **Three-year simple average.** The three-year 1:1:1 averaging is the current procedure used in the apportionment and other aspects of the assessment. Survey catch rates are more variable than commercial catch rates, for a number of reasons that may be unrelated to underlying

stock abundance. While the surveys are spatially extensive, this variance is an inevitable consequence of the limited period in the year over which the surveys are conducted. To provide some stability to the mean catch rate index and make it less susceptible to sampling variance, the survey index can be, and has been for the past several years, averaged over the most recent three years in the data set.

- 2. Three-year reverse-weighted average.** Proposed by industry at the 2009 apportionment workshop. It can be argued that more recent data points of the survey index time series are more relevant than older data when determining current stock distribution. If this premise is accepted but it is desired to retain some accommodation for the interannual sampling variability of the index, a reverse-weighted time averaging could be applied. For the halibut biomass apportionment, staff originally evaluated a 4:2:1 weighting scheme (which is a similar formula to that used in the National Marine Fisheries Service Alaska sablefish assessment, though over a longer period) but both staff and Commissioners believed such a formula resulted in undue reliance on the most recent data point and would lead to overly aggressive harvesting based on this single data point. A less strongly weighted formula was sought and a 2:2:1 formula was investigated, wherein the data from the two most recent years would receive equal weight and the data from the third year would receive one-half the weight of the two most recent years.

Data combinations

- 1. Survey data alone.** The staff has used the data from the Commission's standardized stock assessment survey as the basis for apportionment since the procedure was introduced. The survey is highly standardized, conducted in the same fashion annually, spatially extensive, and provides a consistent data set for the coastwide biomass extending back to 1996. These characteristics commend the survey data as a basis for apportionment.
- 2. Survey data combined with historical removal shares (2:1 weighting).** At the Commission's Apportionment Workshops, industry participants have advocated inclusion of data representing historical removals into the apportionment procedure. The rationale advanced for this view is that long-term historical removals reflected estimated abundance and should therefore reflect sustainable harvests, and that the value should be fixed, rather than a moving average of years. Participants suggested that a 15-yr average of historical catch shares should be incorporated into the apportionment procedures. However, to be relevant, the staff believes the shares should reflect all removals, rather than just commercial catch. Accordingly, the staff has constructed an index composed of a ratio of two parts survey data to one part (2:1) fixed 15-yr average value of historical removal shares for each regulatory area. Note that the historical shares component is a fixed value (1993-2007), rather than a moving average. The 1993-2007 period is the most recent period where removals have not been influenced by survey-based apportionment.

Harvest rate

The staff has frequently evaluated optimal harvest rates for the stock as ongoing research and results of the application of harvest policies accrues (Clark and Hare 2006, 2007; Hare and Clark 2007, 2009). For the central portion of the stock, a harvest rate of 20% continues to be appropriate although this rate is under ongoing review. For the Bering Sea areas, a harvest rate of 15% is appropriate by the analysis of productivity for Areas 4B and 4CDE conducted in 2005, and a similar analysis for Area 4A conducted in 2008. The merit of this lower harvest rate is being

realized, as downward stock trajectories in Area 4 have been reversed with the application of this lower rate. Therefore, the staff recommended Catch Limits for Area 4 in 2010 continue to be based on a 15% harvest rate.

However, the staff has been concerned for several years that the harvest rate in Area 3B may be too high. Despite some reduced catch limits over the past decade, the 3B stock has experienced greater declines in exploitable biomass than the coastwide stock as a whole. For 2010, the long-term productivity of Area 3B was examined and a lower harvest rate is supported by the relationship of surplus production and removals, a more truncated age distribution, and ongoing decline in the Area 3B survey index. Removals have far exceeded surplus production in Area 3B for a number of years. Therefore, the staff recommends that the 15% harvest rate be extended to Area 3B for 2010.

Staff evaluation of adjustment factors, weighting, and data combinations

For 2010, the staff has evaluated the potential options, detailed above, for apportionment of the coastwide exploitable biomass. Of the options considered, the staff recommends adoption of the hook competition and survey timing adjustment factors. At this point, we do not perceive a compelling argument for changing to a 2:2:1 reverse weighting adjustment of the survey index to apportion biomass, from the existing 1:1:1 average. Any reverse weighting scheme that places more emphasis on recent years' data will have the effect of responding more aggressively to short term trends in the survey indices. The halibut population is comprised of many age classes and incoming recruitment forms a small portion of annual changes in stock biomass. Thus, large changes in biomass among years are generally not observed in the halibut stock and the most recent data may well be less representative of longer term trends. The staff is therefore reticent to recommend or adopt, at this time, any reverse weighting scheme. The staff recommends continued use of the current 1:1:1 weighting scheme until a formal evaluation of alternative weighting methods is conducted. Such an evaluation would contemplate a number of factors including, for example, how many years to use in weighting, how to weight those years, consideration of temporal correlation and variance in the survey indices, among others. To adopt a change in the index weighting without a formal evaluation would be viewed as arbitrary and we would not have a strong scientific basis for its use. The staff anticipates completing this analysis and evaluation during 2010 for consideration by the Commission in the 2011 assessment process.

While the Commission staff believes that use of the hook competition adjustment factor has merit, we note that catchability can be affected by myriad factors, some of which can act in an opposite direction from hook competition (e.g., temperature shifts, low dissolved oxygen). We are implementing use of the hook competition adjustment factor here but note that future investigations of catchability may determine that its use as a lone factor affecting catchability is unjustified. The survey timing adjustment has a reasonable premise; that removals influence survey catch rates. The staff agrees that differences in the proportion of annual removals removed prior to the survey in each area should be considered and has developed a procedure to accommodate these differences.

We have once again examined the issue of depth stratification and continue to recommend against its use as an adjustment to survey catch rates. The values of the adjustment factor are not significantly different than 1.0, over the long-term, in any area and we therefore do not recommend use of the depth stratification for the survey index.

Lastly, the staff does not support the use of fixed-value removal shares as a component of the apportionment process. Any fixed value based on previous years will be unresponsive to recent changes in the biomass and dynamics of the stock, the key issue which the apportionment process addresses. Fixed historical catch shares reflect catch limits established using closed-area assessments, which we now know to have been in error because of continuing migration beyond the age of recruitment to the fishery. Entrained in the historical catch shares as well are factors such as the development of higher harvest rates in previous underexploited areas, changes in the assessment model from age- to length-based selectivity, leveraging methods used in western areas to develop quotas prior to 2000, and many other considerations. Therefore, historical catch limits cannot be expected to reflect true stock biomass distribution or productivity. Any potential improvements to individual areas in the future will never be reflected in fixed historical catch shares. Furthermore, there is the issue of selecting the potential weights for the blending. For example, if we were to weight according to the reliability of each index, then historic catch shares should arguably receive relatively low weights for the reasons summarized above. A blending method that includes an index which does not track changes in abundance (historic shares) may provide perceived stability and predictability over the short term, but could lead to sustainability concerns or lost yield (both coastwide and on an individual regulatory area basis) over the long term. The possibility of using a moving (rather than the industry-proposed fixed time frame) window of removal shares has also been raised. Such a moving window approach could theoretically converge with a survey-only based approach under equilibrium conditions (no changes in the relative distribution of biomass among areas). Under more realistic conditions, such as the observed temporal changes in relative distribution of halibut biomass across areas, a moving 15-year long window could result in many of the same problems as the fixed window approach by not being responsive enough to those changes. Staff has discussed many of the issues involved with the use of historical shares as a means of apportionment in both IPHC Biomass Apportionment Workshops. That material can be accessed with the links below. Given the reasons summarized above, the staff recommendations do not include this historical removal shares fixed index.

See discussion on page 10 of the following document:

www.iphc.washington.edu/halcom/meetings/workshop2008/summary/qncomm.pdf

and pages 14 to 16 of the following document:

www.iphc.washington.edu/halcom/meetings/workshop2009/reports/BAWIIforumpostsforRARAFnl0609v2.pdf

Catch limit recommendations

The staff recommendations totaling 48.70 million pounds for 2010, a decrease of approximately 10% from 2009, are presented in Table 1. The Area 2A recommendation includes all removals (commercial, treaty Tribes, and sport) allocated by the Pacific Fishery Management Council's Catch Sharing Plan. Area 4CDE is treated as a single regulatory unit by the Commission, although the North Pacific Fishery Management Council's (NPFMC) Catch Sharing Plan allocates the Commission catch limit into limits for the individual regulatory areas. The Area 2B catch limit recommendation includes totals for the commercial and sport fisheries. The Canadian Department of Fisheries and Oceans (DFO) will allocate the adopted catch limit between the sport and commercial fisheries. For Areas 2C and 3A the catch limit recommendation includes the use of the NPFMC and National Marine Fisheries Service (NMFS) authorized Guideline Harvest Levels (GHL) for the halibut recreational charter fisheries of 0.788 Milb and 3.650 Milb, respectively, as the projected removals by that sector for 2010. The catch limit recommendations are made with

the expectation that both Canada and the U.S. will manage to their domestic targets for sport fish catch in order that the Commission's management targets for 2010 will be achieved.

The staff continues to recommend a slow rate of increase in catch limits when estimated Fishery CEY is increasing and a more rapid reduction of catch limits when CEY is decreasing (a Slow Up – Fast Down policy). For Areas 2, 3, and 4A the staff recommends catch limits that are lower by one-half of the difference between 2009 catch limits and the estimated Fishery CEYs for 2010. For Areas 4B and 4CDE, the staff recommends an increase over the 2009 catch limit equivalent to one-third of the difference between the 2009 catch limit and the estimated 2010 fishery CEY.

Fishing periods

As in the past years, the staff recommends March 15 to November 15 opening and closing dates for the quota share fishing season. This recommendation is a compromise between minimizing interceptions of migrating fish and providing opportunity for market presence of fish wild halibut. The Area 2A fishery should also occur within this period.

For the Area 2A directed commercial fishery, the staff surveyed the directed commercial license holders to determine their preferred starting week from the following: May 17, May 31, June 14, June 28, July 12, or July 19 and their preferred week day for fishing from Monday, Wednesday, or not important. The staff supports the directed commercial harvester's choice for the first directed commercial opening the week of June 28 with fishing days of Wednesday. Therefore, we recommend the following series for 2010: June 30, July 14, July 28, August 11, August 25, September 8, and September 22. Fishing on these dates would consist of 10-hour periods, with fishing period limits to ensure that the catch limit is not exceeded, as in past years. The size of the fishing period limits will be determined when more information on fleet participation is available.

Catch sharing plans: Areas 2A, 2B, and 4CDE

The Commission does not make allocative decisions within regulatory areas or among different user groups. However, for Areas 2A and 4CDE the staff recommends that the Commission endorse the catch sharing plans developed by the Pacific and North Pacific Fishery Management Councils for these areas, respectively. Similarly, the staff recommends that the catch sharing allocation of 88% commercial and 12% recreational, developed by the DFO for Area 2B, be endorsed.

Proposed changes to the IPHC regulations

Area 2A license requirement

IPHC staff recommends changing the regulations to reflect that the Area 2A IPHC license requirements are not for persons fishing in Subarea 2A-1 as members of U.S. treaty Indian tribes. The tribal fisheries have their own licensing requirements and tribal members currently do not obtain IPHC vessel licenses. IPHC does not require tribal vessels to be licensed and this change would reflect the status quo.

License numbers and State fish tickets

In the current IPHC regulations, where it is required that the total halibut weight must be recorded on the State fish tickets it is also required that a vessel number is recorded on State fish tickets. The IPHC regulations should be changed to reflect that the vessel number is the state,

federal, or tribal vessel number (i.e., not IPHC vessel number). We also recommend adding to the IPHC regulations that Washington tribal tickets can be used as they are currently used by some treaty tribes in Area 2A-1. The same IPHC regulations that apply to State tickets would apply to tribal tickets.

IPHC regulations currently state that the IPHC license number be recorded on State fish tickets. This regulation should be removed as Area 2A is the only area that IPHC licenses are required and the IPHC number is not currently recorded or needed on State fish tickets.

Cape Spencer Light

The Cape Spencer Light coordinates are used to define Area 2C. The IPHC staff recommends updating the coordinates to the 2009 U.S. Coast Guard Light List (changed from the 2003 U.S. Coast Guard Light List of 58°11'54"N, 136°38'24"W) to 58°11'56"N, 136°38'26"W.

References

- Clark, W.G., and Hare, S.R. 2006. Assessment and management of Pacific halibut: data, methods, and policy. *Int. Pac. Halibut Comm. Sci. Rep.* 83.
- Clark, W.G., and Hare, S.R. 2007. Assessment of the Pacific halibut stock at the end of 2006. *Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2006*:98-128.
- Hare, S.R. and Clark, W.G. 2007. IPHC harvest policy analysis: past, present, and future considerations. *Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2007*: 275-295.
- Hare, S.R. and Clark, W.G. 2009. Assessment of the Pacific halibut stock at the end of 2008. *Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2008*: 137-202.
- Hare, S.R. 2010. Assessment of the Pacific halibut stock at the end of 2009. *Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2009*: 91-170.

Table 1. Staff recommended catch limits for 2010 by IPHC regulatory area (million lbs, net weight). Recommendations based on coastwide assessment of exploitable biomass with survey apportionment to Regulatory Area exploitable biomass. Removal data are preliminary. Also shown are the 2009 catch limits for comparison.

Reg Area	Exploitable biomass	Harvest Rate	Total CEY	2009 Other Removals	2009 Catch Limit	2010 Fishery CEY	Slow Up-Fast Down Adjustment	2010 Catch Limit Recomm.	
2A	4.09	20.0%	0.82	0.25	0.95	0.57	+0.19	0.76	^{1,4}
2B	30.38	20.0%	6.08	0.52	7.63	5.55	+1.04	6.59	^{2,4}
2C	25.10	20.0%	5.02	2.63	5.02	2.39	+1.31	3.71	⁴
3A	130.96	20.0%	26.19	7.91	21.70	18.28	+1.71	19.99	⁴
3B	65.72	15.0%	9.86	0.95	10.90	8.91	+1.00	9.90	⁴
4A	21.67	15.0%	3.25	1.13	2.55	2.12	+0.22	2.33	⁴
4B	19.86	15.0%	2.98	0.23	1.87	2.75	-0.59	2.16	³
4CDE	36.21	15.0%	5.43	1.61	3.46	3.82	-0.24	3.58	³
Total	334.00	17.9%	59.63	15.23	54.08	44.40	+4.64	49.03	

Note: Exploitable biomass is coastwide assessment, survey partitioning; Hook & Timing Afs; 1:1:1 wts

¹ Catch limits and Fishery CEY for 2A includes commercial, sport, and treaty subsistence catches

² Catch limits and Fishery CEY for 2B includes commercial and sport catch

³ Calculated as 2009 catch limit plus 1/3 of the difference between
2010 Fishery CEY and 2009 Catch Limit

⁴ Calculated as 2009 Catch Limit minus 1/2 of the difference between
2010 Fishery CEY and 2009 Catch Limit

Assumes GHL of 0.788 Mlb in Area 2C, 3.65 Mlb in Area 3A under Other Removals
Other removals for 2C and 3A are adding projected unguided harvest to the applicable GHL

!Subsequent to printing of the Blue Book for the 2010 Annual Meeting, errors were discovered in data for Area 4CDE. This table contains corrected values highlighted.

Table 2. Estimated fishery CEY, staff recommended catch limits, catch, percent of catch limits taken of Pacific halibut by IPHC regulatory area (in thousands of pounds, net weight), 2005-2009.

Regulatory Area	ESTIMATED FISHERY CEY					STAFF RECOMMENDATIONS				
	2005	2006	2007 ¹	2008	2009	2005	2006	2007 ¹	2008	2009
2A ²	1,170	1,490	660	650	500	1,330	1,380	1,020	1,000	860
2B ³	12,700	13,200	6,220	4,650	4,920	13,250	13,220	9,720	8,060	6,960
2C	11,800	10,330	4,980	3,920	2,860	10,930	10,630	7,810	6,210	4,540
3A	26,300	24,940	27,630	22,250	20,840	25,470	25,200	26,010	24,220	22,530
3B	10,700	8,570	16,770	14,270	13,200	13,150	10,860	12,830	10,900	11,670
4A	3,400	3,250	5,230	3,510	2,200	3,440	3,350	3,980	3,100	2,650
4B	1,700	1,070	2,560	2,700	2,090	2,260	1,670	1,970	1,860	1,940
4CDE	4,400	3,110	3,850	3,680	1,970	3,990	3,550	3,650	3,890	2,930
Total	72,170	65,950	67,900	59,240	48,580	73,820	69,860	66,990	59,240	54,080
Regulatory Area	COMMISSION APPROVED CATCH LIMITS ⁴					CATCH ⁵				
	2005	2006	2007 ¹	2008	2009	2005	2006	2007	2008	2009 ⁶
2A ²	1,330	1,380	1,340	1,220	950	1,309	1,369	1,311	1,185	990
2B ³	13,250	13,220	11,470	9,000	7,630	14,089	13,723	11,250	9,219	7,665
2C	10,930	10,630	8,510	6,210	5,200	10,489	10,397	8,346	6,145	4,860
3A	25,470	25,200	26,200	24,220	21,700	25,228	25,238	26,133	24,166	21,352
3B	13,150	10,860	9,220	10,900	10,900	12,874	10,565	9,047	10,617	10,620
4A	3,440	3,350	2,890	3,100	2,550	3,329	3,278	2,786	2,973	2,446
4B	2,260	1,670	1,440	1,860	1,870	1,923	1,542	1,369	1,723	1,525
4CDE	3,989	3,550	4,100	3,890	3,460	3,459	3,199	3,830	3,852	3,293
Total	73,819	69,860	65,170	60,400	54,080	72,700	69,311	64,072	59,880	52,751
Regulatory Area	PERCENT OF CATCH LIMIT TAKEN									
	2005	2006	2007	2008	2009					
2A	98	99	98	97	104					
2B	106	104	98	102	100					
2C	96	98	98	99	93					
3A	99	100	100	100	98					
3B	98	97	98	97	97					
4A	97	98	96	96	96					
4B	85	92	95	93	82					
4CDE	87	90	93	99	95					
Total	98	99	98	99	98					

¹Estimated fishery CEY and staff recommendations from coastwide stock assessment with survey partitioning to area as presented in the 2007 Annual Meeting Handout. The closed area stock assessment produced staff recommendations by area in millions of pounds of: Area 2A = 1.34; Area 2B = 11.47; Area 2C = 8.51; Area 3A = 26.20; Area 3B = 9.22; Area 4A = 2.89; and 4B = 1.44 and Area 4CDE = 4.10. The Commission determined the 2007 catch limits using recommendations based on the closed area stock assessment.

² Area 2A includes sport catch and treaty Indian catch

³ Area 2B includes sport catch

⁴ Catch limits do not include additional pounds from underage/overage programs

⁵ Catch does not include IPHC research catch

⁶ 2009 data are preliminary

