INTERNATIONAL PACIFIC HALIBUT COMMISSION

Evaluation of directed commercial fishery size limits in 2020

Agenda item 6.5

IPHC-2020-IM096-09

Quick summary

- Removing the minimum size limit in 2020:
  - Would have increased potential yield by 7% and fishery efficiency by 18%, and decreased discard mortality by 0.8 Mlb
  - Would have maintained coastwide aggregate fishery value if average prices for U32 landings were at least 63% of those for O32 fish
  - Would have had substantially different effects among IPHC Regulatory Areas

Quick summary

- Adding a maximum size limit of 60” (152 cm) in 2020:
  - Would have been approximately fishery yield and value neutral
  - Would have increased discard mortality by 0.12 Mlb and decreased fishery efficiency (-3%)
  - Would tend to increase spawning biomass of and recreational encounters with larger fish
  - Would not likely produce a net change in recruitment
  - Would have had substantially different effects among IPHC Regulatory Areas

Document overview

- Summary of historical studies
- Summary of data informing the Minimum Size Limit (MinSL) analysis
- Summary of data informing the Maximum Size Limit (MaxSL) analysis
- Evaluation of the MinSL
- Evaluation of one potential MaxSL (60”)

Historical studies

- Increasing foregone yield estimated over time
  - Roughly tracks declines in size-at-age
- Increasing recognition of the importance of discards and discard mortality rates to the success of a minimum size limit
- The shift to an SPR-based management procedure ensures adequate spawning potential regardless of the demographics of mortality

How much is currently discarded?

U32 discard mortality (Mlb; Table 2)

Year	2A	2B	2C	3A	3B	4A	4B	4CDE	Coastwide
2019	0.03	0.13	0.07	0.32	0.16	0.09	0.03	0.07	0.90
3-year average	0.02	0.14	0.07	0.32	0.20	0.07	0.03	0.04	0.88
5-year average	0.02	0.17	0.09	0.37	0.21	0.07	0.03	0.05	1.01
10-year average	0.02	0.20	0.11	0.58	0.39	0.08	0.04	0.07	1.49

U32 discard mortality (% of total commercial; Table 3)

Year	2A	2B	2C	3A	3B	4A	4B	4CDE	Coastwide
2019	3%	2%	2%	4%	6%	6%	3%	4%	4%
3-year average	2%	2%	2%	4%	7%	5%	3%	3%	3%
5-year average	3%	3%	2%	5%	7%	5%	3%	3%	4%
10-year average	3%	3%	3%	5%	8%	5%	3%	3%	5%

Large fish

(Table 4; abridged)

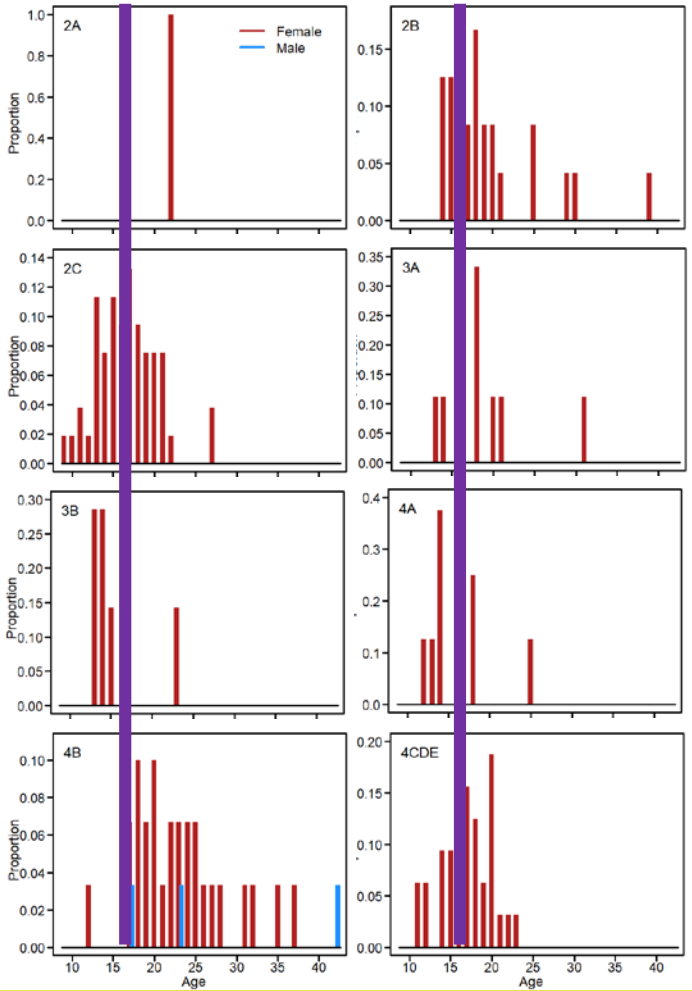
- Essentially all female
- Not necessarily very old
- Contribution to current fishery varies by Regulatory Area

IPHC Regulatory Area	Length greater than (in, cm)	Average net weight (lb, kg)	Average age (range)	% female (weight)[1]	% of Landings (weight)
2A	55, 140	66, 30	16 (10-23)	100%	<1%
	60, 152	109, 49	22 (22-22)	100%	<1%
	65, 165	109, 49	22 (22-22)	100%	<1%
2B	55, 140	75, 34	18 (9-39)	100%	8%
	60, 152	92, 42	20 (14-39)	100%	4%
	65, 165	112, 51	22 (15-31)	100%	1%
2C	55, 140	71, 32	17 (9-36)	100%	17%
	60, 152	86, 39	17 (9-36)	100%	6%
	65, 165	114, 52	18 (13-36)	100%	2%
3A	55, 140	69, 31	16 (11-31)	100%	4%
	60, 152	85, 39	18 (12-31)	100%	2%
	65, 165	119, 54	20 (18-21)	100%	<1%
3B	55, 140	70, 32	14 (11-23)	96%	5%
	60, 152	92, 42	16 (13-23)	100%	1%
	65, 165	144, 65	20 (17-23)	100%	<1%
4A	55, 140	70, 32	18 (11-39)	100%	5%
	60, 152	100, 45	19 (12-39)	100%	1%
	65, 165	118, 54	23 (14-39)	100%	1%
4B	55, 140	80, 36	21 (8-42)	94%	11%
	60, 152	100, 45	23 (12-42)	92%	7%
	65, 165	120, 54	23 (12-40)	100%	4%
4CDE	55, 140	74, 34	16 (11-24)	100%	9%
	60, 152	88, 40	17 (11-24)	100%	4%
	65, 165	108, 49	18 (11-22)	100%	1%

Large fish (60”+)

(Figure 3)

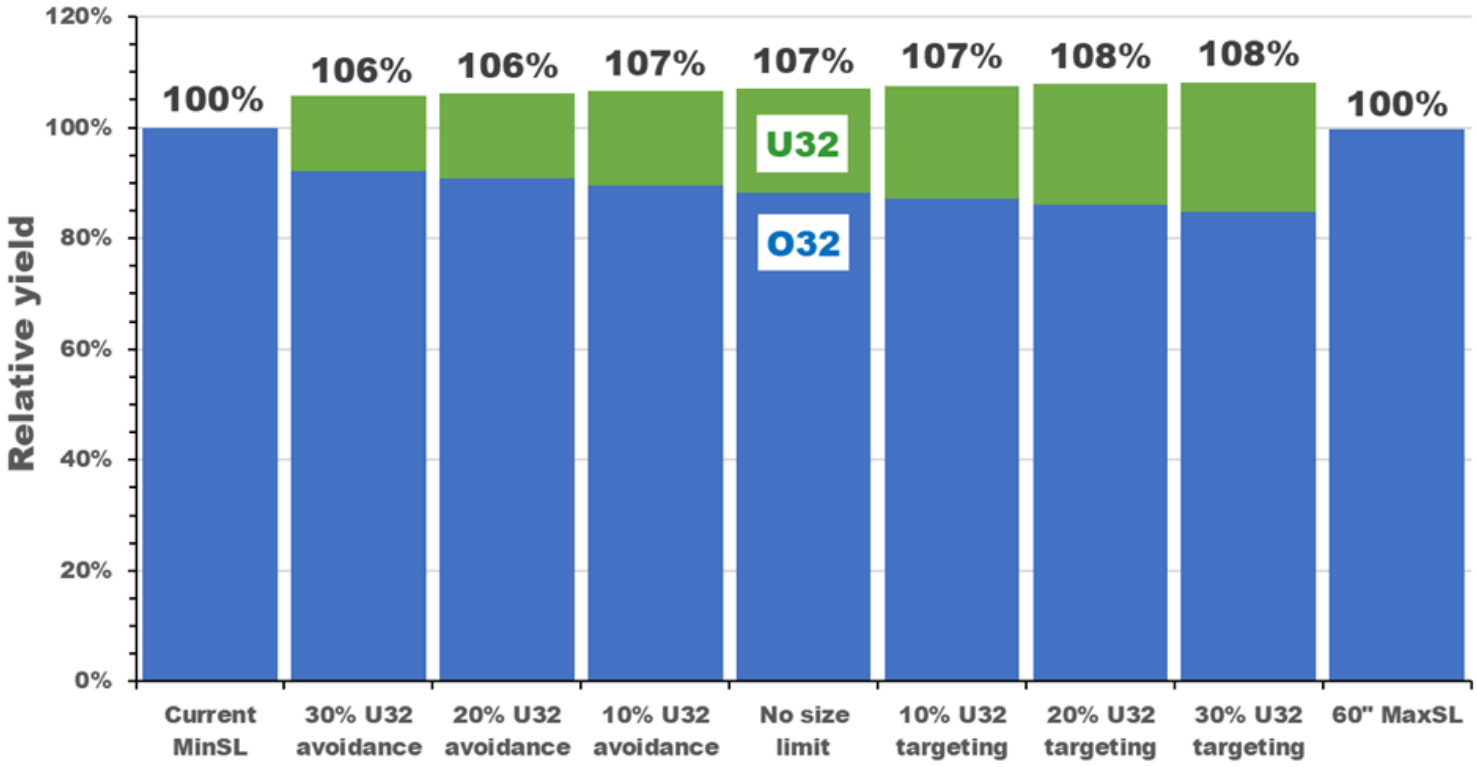
Age 16: relatively common in fishery



Basic methods

- Replay the 2020 mortality limits
  - Remove/add size limit(s)
  - Adjust fishery targeting or avoidance
- Match the same SPR
- Calculate yield, discards, relative proportions of the catch, fishery efficiency, fishery value, etc.

Change in yield (Figure 4)



MinSL Differences by Regulatory Area (Table 6)

Percent U32 in landings

Fishery	No MinSL	U32 avoidance			U32 targeting		
		10%	20%	30%	10%	20%	30%
Coastwide	18%	16%	15%	13%	19%	20%	22%
Region 2	12%	11%	10%	9%	13%	14%	15%
2A	15%	14%	13%	11%	17%	18%	19%
2B	13%	12%	11%	10%	14%	15%	16%
2C	9%	8%	7%	7%	10%	11%	12%
Region 3	21%	20%	18%	16%	23%	24%	26%
3A	19%	17%	16%	14%	20%	22%	23%
3B	28%	26%	23%	21%	30%	31%	33%
Region 4	23%	21%	19%	17%	25%	27%	28%
4A	26%	24%	22%	19%	27%	29%	31%
4CDE	21%	19%	17%	16%	23%	24%	26%
Region 4B	16%	15%	13%	12%	18%	19%	20%

MinSL Differences by Regulatory Area (Table 7)

Critical price ratio: *what fraction of the O32 price is needed for U32s?*

Fishery	No MinSL	U32 avoidance			U32 targeting		
		10%	20%	30%	10%	20%	30%
Coastwide	63%	61%	59%	58%	63%	64%	65%
Region 2	57%	55%	54%	53%	57%	57%	58%
2A	61%	59%	57%	56%	62%	62%	63%
2B	58%	56%	54%	53%	58%	59%	59%
2C	47%	45%	43%	43%	47%	48%	49%
Region 3	67%	65%	63%	62%	67%	68%	68%
3A	64%	63%	61%	59%	65%	65%	66%
3B	68%	66%	65%	63%	69%	69%	70%
Region 4	62%	60%	57%	55%	63%	64%	65%
4A	67%	66%	64%	62%	68%	69%	70%
4CDE	66%	64%	62%	60%	66%	67%	68%
Region 4B	62%	60%	58%	57%	62%	63%	64%

→ Improved efficiency could lower this further from a harvester's perspective

Discussion of other considerations

- Difference between fishery and survey encounters with large fish
- Economic value beyond price at landing
- Logistics of implementation
- Effects on size-at-age
- Spatial effects and differences
- Spawning biomass and recruitment
- Public perception
- Testing via MSE

Summary

	Management action	
Response	Remove MinSL	Add MaxSL = 60”
Fishery yield	7% increase	No change
Fishery value	Increased if U32 price >= 63% of O32 price	No change
Discard mortality	Decreased by 0.80 million pounds	Increased by 0.12 million pounds, may increase further over time
Fishery efficiency (landings/catch)	18% increase	3% decrease
Data on total fishery catch and biology	Improved	Degraded
Recreational encounters with large fish	No change	Increased
Abundance/biomass of old females	No change	Increased
Average projected recruitment	No change	No change

Recommendations

That the Commission:

- **NOTE** paper IPHC-2020-IM096-09 which provides a response to requests from AM096.
- **REQUEST** any changes to this document for presentation at the 97th Session of the IPHC Annual Meeting (AM097).

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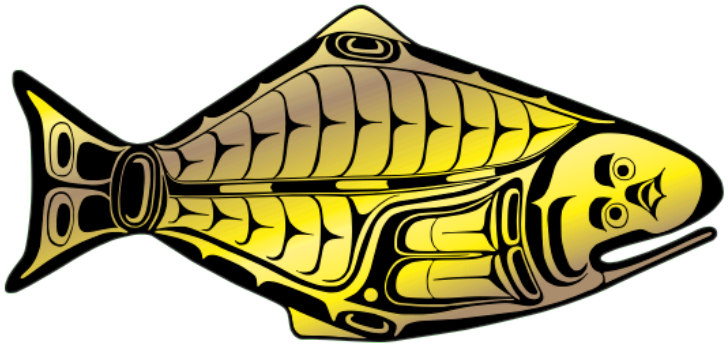

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