

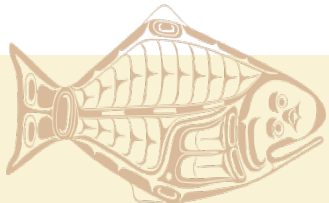
Estimates of Pacific halibut stock distribution within Area 2A

Steve Keith, Ray Webster, and Jamie Goen
International Pacific Halibut Commission

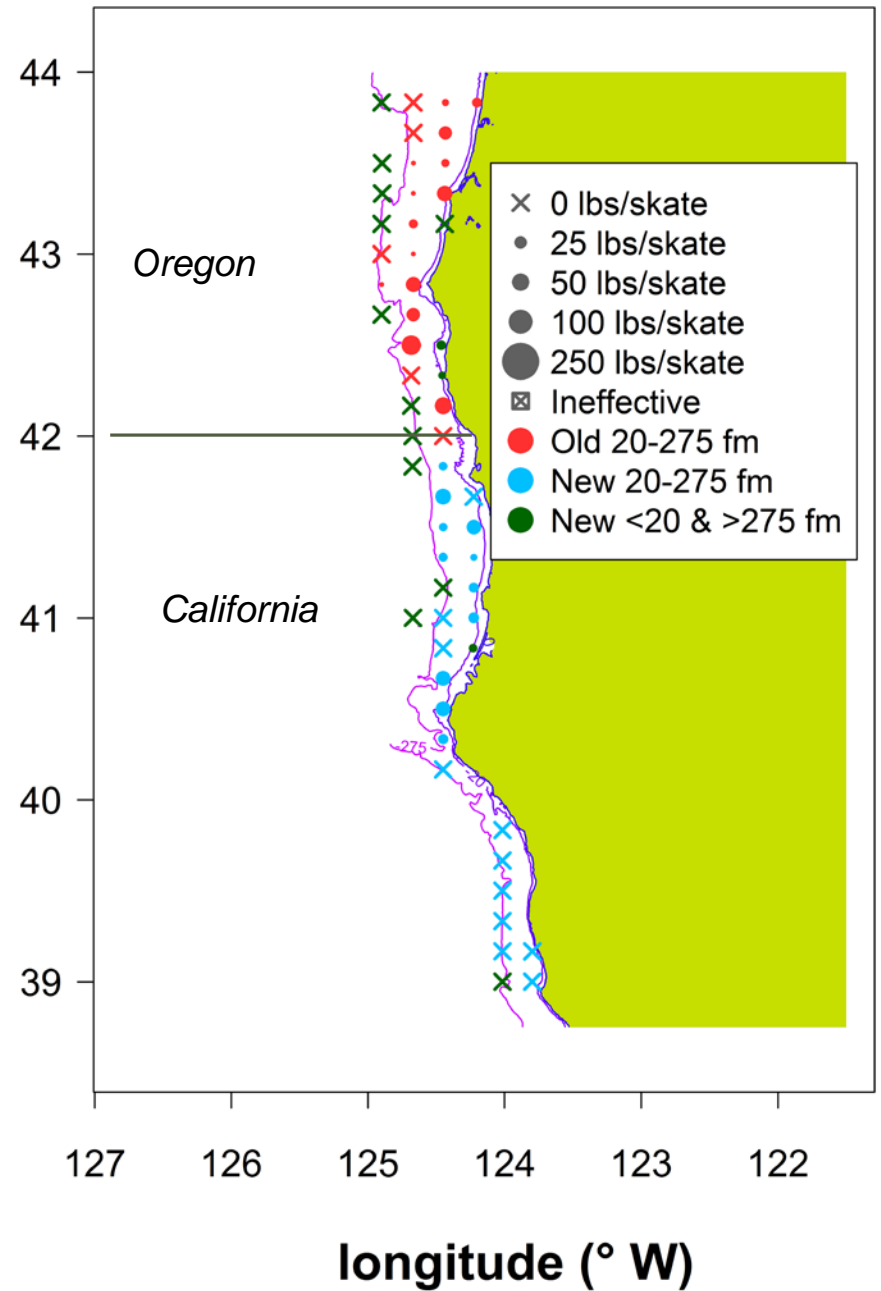
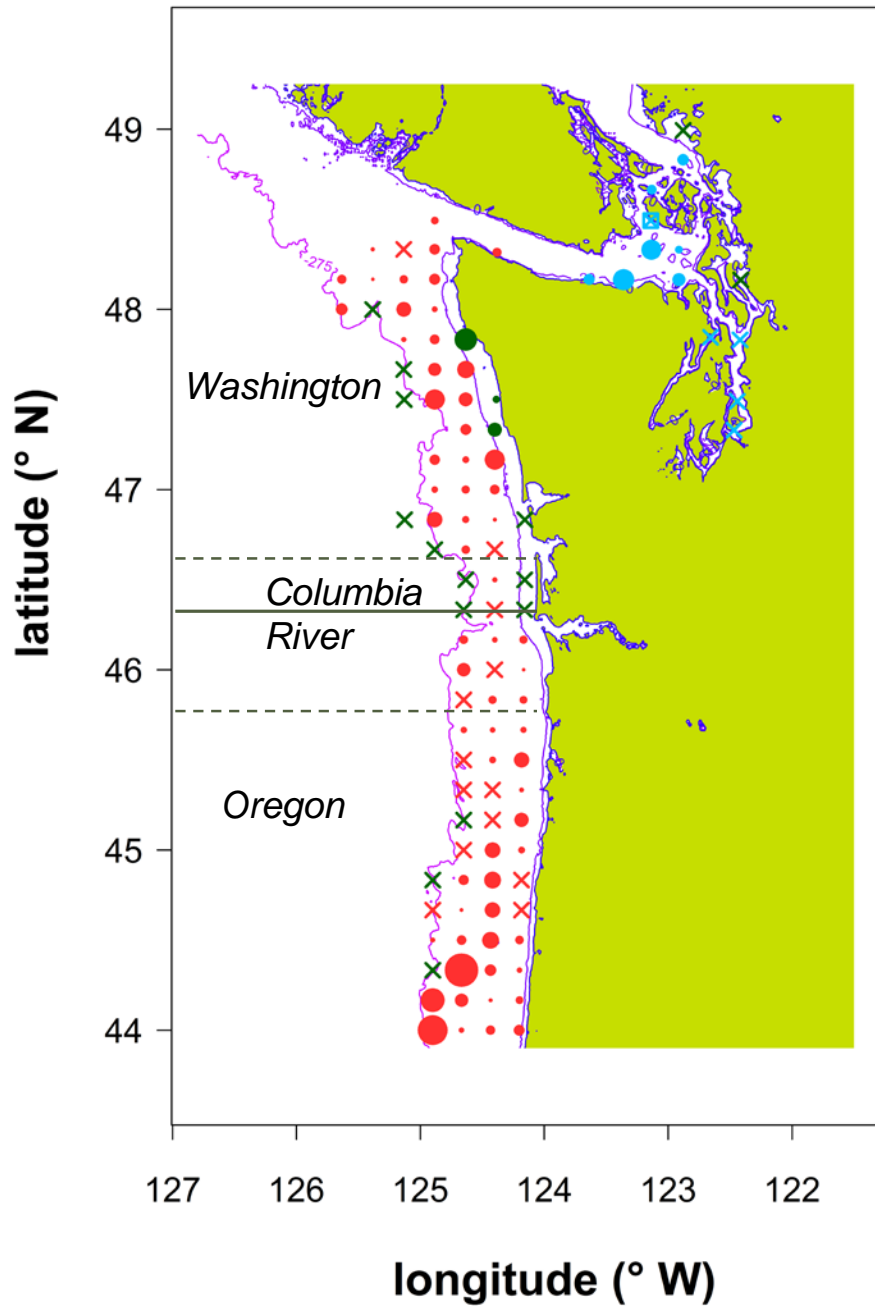
Pacific Fishery Management Council
12 June 2017

IPHC setline survey

- Annual survey of 96 stations in WA and OR in depths of 20-275 fm.
- Survey expansions:
 - 2011: Salish Sea and in depths of 10-20 and 275-400 fm in WA and OR
 - 2013: California to 40°N (20-275 fm only)
 - 2014: Salish Sea, California to 39°N, and 10-20 and 275-400 fm in WA, OR and CA

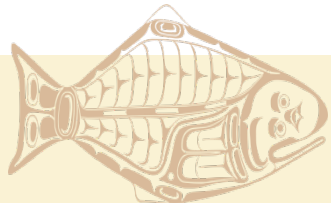


2014 IPHC setline survey stations in Area 2A



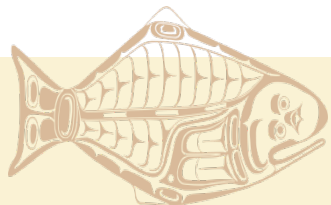
WPUE density index

- The IPHC currently uses the survey weight per unit effort (WPUE, units lb/skate) of Pacific halibut with fork length greater than 81.3 cm (commercial size limit) to estimate the stock distribution among regulatory areas.
- The WPUE density index is multiplied by bottom area to get a biomass index for a region.
- A region's share of total biomass is then calculated by dividing that region's biomass index by the sum of all regions' biomass indices.



WPUE estimation

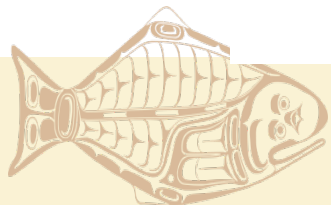
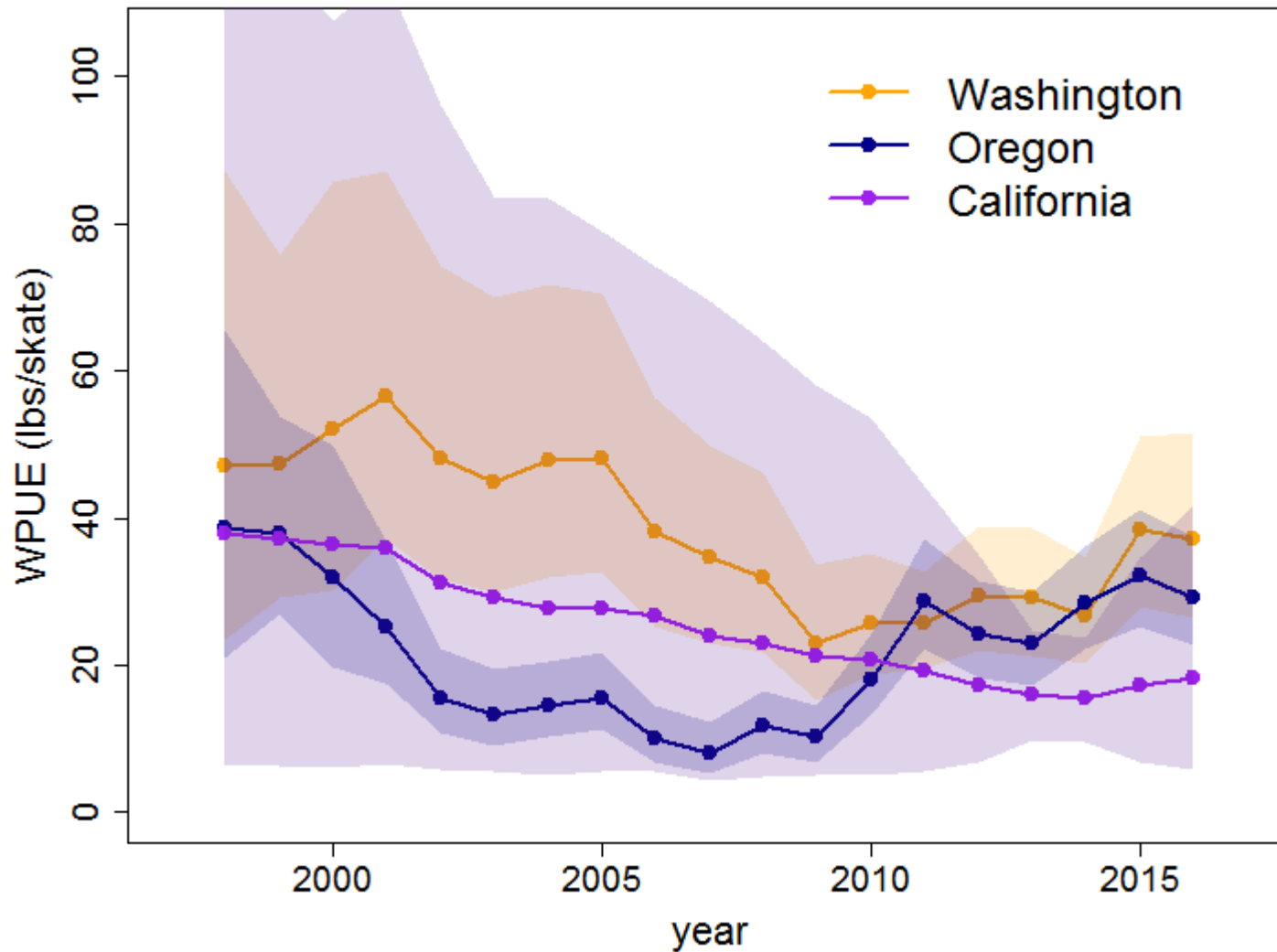
- The raw survey data are used as the primary input in space-time models for estimating WPUE indices.
- Modelling allows us to estimate indices even in regions that lack survey coverage in a given year.
- Uncertainty in estimates will be high for regions with few survey stations, and for regions with no recent survey coverage.



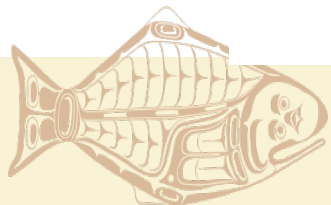
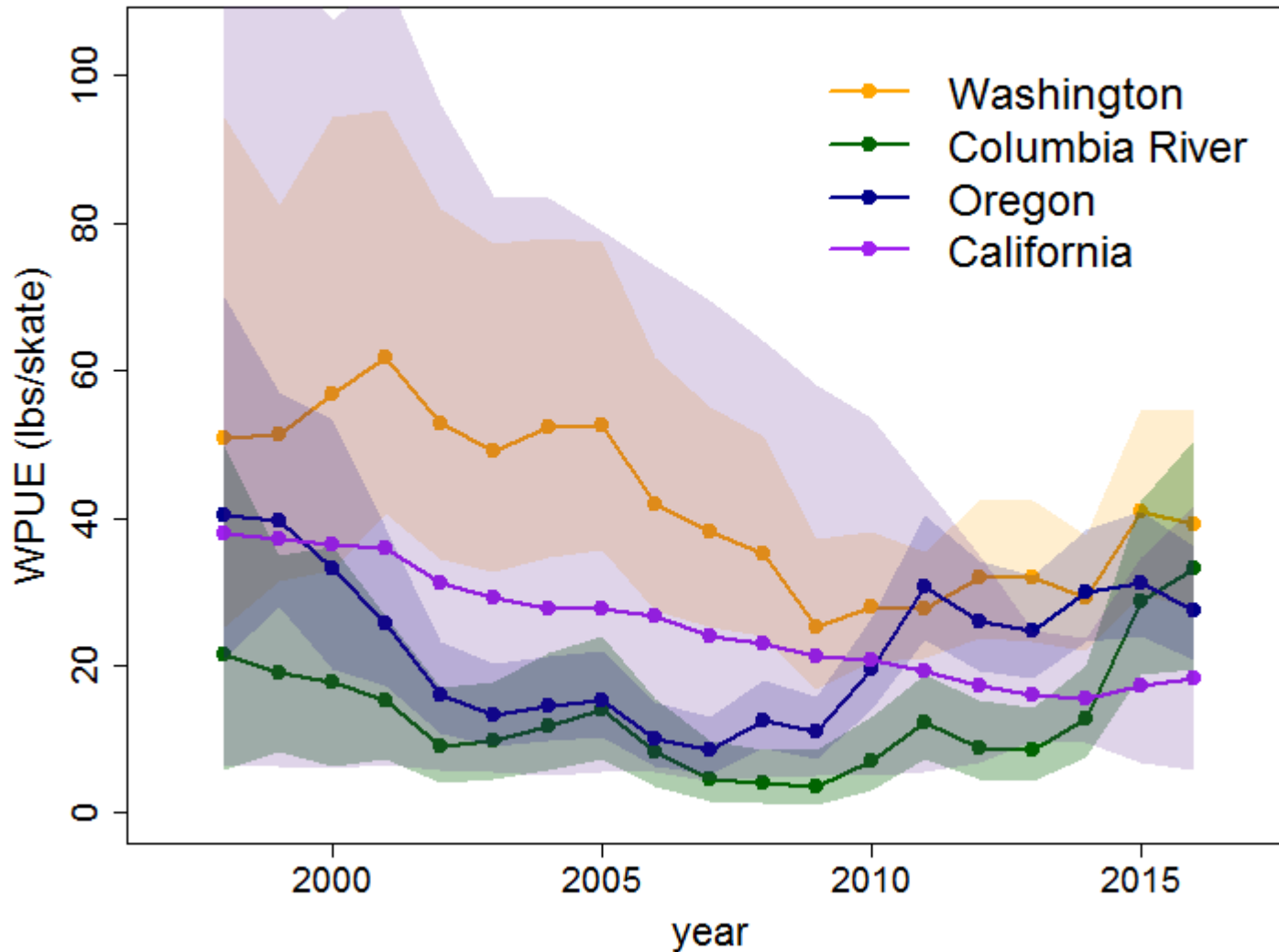
Survey WPUE (raw data, lb/skate)

Year	Washington		Columbia River		Oregon		California	
	Mean	N	Mean	N	Mean	N	Mean	N
1998								
1999	50.7	25	12.3	9	34.5	50		
2000								
2001	99.9	25	26.0	9	15.0	50		
2002	80.8	25	5.1	9	14.5	50		
2003	54.5	25	6.7	9	8.5	50		
2004	61.9	25	6.4	9	13.2	50		
2005	71.9	25	10.3	9	9.3	50		
2006	36.8	25	4.6	9	8.0	50		
2007	52.4	25	1.8	9	4.9	50		
2008	40.3	25	2.0	9	10.5	50		
2009	17.0	25	0.6	9	4.9	50		
2010	27.5	25	2.6	9	14.0	50		
2011	26.0	52	8.7	15	22.7	67		
2012	46.2	30	5.0	11	25.7	54		
2013	31.7	30	6.5	11	23.3	55	22.1	15
2014	21.2	53	6.4	15	21.1	67	9.2	27
2015	47.0	30	27.5	11	23.2	55		
2016	37.5	30	23.7	11	26.2	54		

Estimated WPUE 1998-2016: states



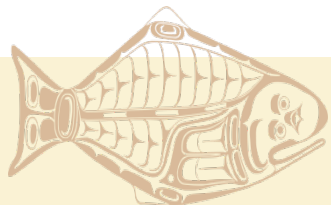
Estimated WPUE 1998-2016: regions



Bottom areas for Area 2A states and regions

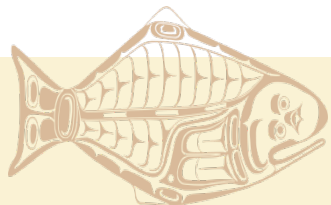
State	Bottom area (nmi ²)
Washington	6407
Oregon	7954
California (to 39°N)	3153

Region	Bottom area (nmi ²)
Washington	5769
Columbia River	1767
Oregon	6826
California (to 39°N)	3153



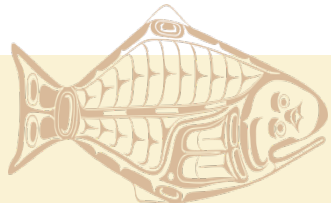
Estimated biomass distribution (%) with 95% intervals, 2012-2016

Year	Washington	Oregon	California
2012	43.3 (34.6, 52.6)	44.3 (35.7, 53.7)	12.4 (5.4, 22.9)
2013	44.4 (36.0, 53.0)	43.5 (35.4, 52.2)	12.1 (7.7, 17.8)
2014	38.3 (30.6, 46.4)	50.7 (42.7, 58.9)	11.0 (6.9, 16.1)
2015	44.2 (35.6, 53.2)	46.0 (37.6, 54.7)	9.8 (4.2, 17.9)
2016	45.0 (35.2, 55.7)	44.3 (34.7, 53.4)	10.7 (3.7, 22.1)



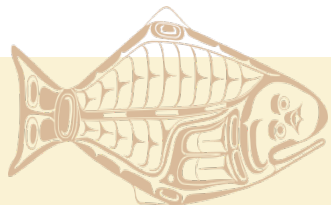
Estimated biomass distribution (%) with 95% intervals, 2012-2016

Year	Washington	Columbia River	Oregon	California
2012	42.6 (33.9, 52.0)	3.7 (1.9, 6.3)	41.3 (32.6, 50.6)	12.5 (5.4, 23.0)
2013	43.9 (35.6, 52.7)	3.6 (1.8, 6.1)	40.3 (32.3, 49.0)	12.2 (7.8, 17.9)
2014	37.8 (30.2, 45.8)	5.1 (3.0, 8.1)	46.0 (38.0, 54.4)	11.1 (7.0, 16.3)
2015	42.5 (34.1, 51.4)	9.2 (5.8, 13.3)	38.5 (30.6, 46.7)	9.8 (4.2, 17.8)
2016	42.6 (32.9, 53.3)	11.1 (6.6, 16.8)	35.6 (27.1, 44.6)	10.7 (3.7, 22.1)



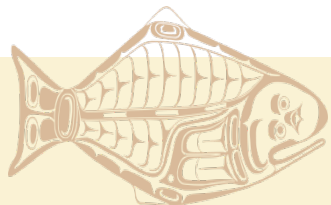
Biomass distribution summary

- We estimate the following range of state shares of Pacific halibut biomass north of 39°N for the past 5 years:
 - 38-45% in WA
 - 44-51% in OR
 - 10-12% in CA
- We estimate the following range of regional shares of Pacific halibut biomass north of 39°N for the past 5 years:
 - 38-44% in WA
 - 4-11% in Columbia River
 - 36-46% in OR
 - 10-12% in CA



Biomass distribution summary

- Uncertainty in all estimates is high, and has increased quickly in CA as time passes since the 2014 survey.
- The most precise estimates come from 2014, the year of greatest survey coverage.
- However, the most recent estimates represent our best understanding of the current stock distribution
 - The high uncertainty in the 2016 CA estimate shows that we really know little of how the biomass in this region has changed in the last two years.



Other Matters

- IPHC request for PFMC to consider moving away from a directed commercial derby fishery to:
 - Increase safety
 - Reduce regulatory discards (wastage)
 - Increase flexibility for fishers and processors
- Pilot observer coverage in 2017 on directed commercial derby fishery.

