A comparison of Pacific herring decision tables using 1951:2010 data and different priors for q.

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Jaclyn,

Here are the four tables you requested. To construct these tables I've run two scenarios that differ only in the prior information on q. In Tables 2 and 3, the q in the second period is approximately equal to 1 (where a very small variance for the prior on q is assumed) and a uniform prior for q in the first period. The catch advice in Table 3 is based on the updated estimates of B_0, where the cuttoff is set based on 0.25 times the median value of B_0 obtained from the joint posterior distribution.

Tables 4 and 5 are similar to the previous tables except in this case, a less informative prior for q_2 and a more informative prior for q_1 was used. In this case I used a normal prior for $\ln(q)$ with a mean of -0.569 and a standard deviation of 0.274 (derived in the Appendix of the assessment document).

A couple of comments that you might find helpful in trying to understand these results and the discrepancies between this and the assessment document. First off the PRD estimates of B_0 are highly uncertain and tend to have a very long tail. This long tail can drag the median values upwards (in this case substantially). Second, the information presented in Tables 2–5 are based on the old (HCAM implementation) weight-based selectivity function for the gillnet fishery. Table 2.5 and 2.6 in the assessment document are based on a different selectivity function that uses deviations in average-weight to explain changes in selectivity for the gillnet fishery. In that case, the age-composition data from the gillnet fishery does not suggest that changes in mean body weight on influences in selectivity (but of course this could also be confounded with changes in natural mortality over time). Bottom line is that the change in the selectivity function for the GN fishery also has a significant impact on the catch advice; the gillnet fishery selectivity has not tended to catch older fish over time as was previously thought.

Components of the objective function values for each of the model runs is summarized in Table 1. These are negative loglikelihoods and a smaller value implies a better fit to the data. For most of the areas, better fits to the survey data were obtained when using the less informative prior for q. A similar table should be constructed with the new selectivity function to better understand this (and explain it). But I ran out of time. Hope this helps. Steve.

Table 1: Components of the negative log-likelihood function for each model run. Columns with the suffix are runs using the normal prior for $\ln(q)$ in both periods. Smaller values imply a better fit to the data.

Component	HG	HGqp	PRD	PRDqp	CC	CCqp	SOG	SOGqp	WCVI	WCVIqp
Wtr Sn Catch	−35.84	−35.86	−66.79	−66.75	−49.95	−49.91	−103.53	−103.64	−34.17	−34.28
Sn-Roe Catch	−46.69	−46.71	−58.82	−58.82	−60.40	−60.41	−64.00	−64.01	−57.01	−57.04
GN Catch	−27.68	−27.68	−61.48	−61.27	−53.37	−53.36	−70.09	−70.37	−44.73	−44.74
Survey 1	22.32	20.53	28.18	29.11	22.53	22.75	10.57	8.91	19.28	16.55
Survey 2	12.02	10.19	5.45	5.61	3.72	3.42	7.03	6.55	11.06	10.91
Wtr Sn Age	−55.99	−57.91	−164.95	−162.98	−92.84	−92.88	−319.49	−325.75	−106.73	−105.76
Sn-Roe Age	−251.23	−249.98	−264.81	−270.76	−375.44	−376.15	−419.77	−415.15	−466.31	−462.06
GN Age	−50.53	−50.88	−284.08	−285.24	−281.00	−279.83	−272.42	−266.61	−117.55	−114.95
Recruitment	72.39	66.01	60.30	60.12	61.24	60.87	34.98	33.71	44.34	40.38
Total	−361.23	−372.28	−806.99	−810.98	−825.52	−825.50	−1196.71	−1196.35	−751.80	−750.98

Table 2: Estimated spawning stock biomass, age-4+ biomass and pre-fishery biomass for poor average and good recruitment, cutoffs based on 1996 estimates of B_0, and available harvest based on median values from the joint posterior distribution with $q_2 \approx 1.0$.

			Pre-fishery forecast biomass				**Available harvest**		
Stock	SSB	4+ Biomass	Poor	Average	Good	Cutoff	Poor	Average	Good
HG	6,568	4,332	6,091	8,783	15,927	10,700	0	0	3,185
PRD	21,182	14,840	17,165	19,894	27,548	12,100	3,433	3,979	5,510
CC	6,869	2,481	4,670	6,995	12,578	17,600	0	0	0
SOG	44,720	24,272	36,526	45,803	59,196	21,200	7,305	9,161	11,839
WCVI	3,508	1,144	4,013	7,188	12,648	18,800	0	0	0

Table 3: Estimated spawning stock biomass, age-4+ biomass and pre-fishery biomass for poor average and good recruitment, new cutoffs based on $0.25B_0$, and available harvest based on median values of the joint posterior distribution with $q_2 \approx 1.0$.

			Pre-fishery forecast biomass				**Available harvest**		
Stock	SSB	4+ Biomass	Poor	Average	Good	Cutoff	Poor	Average	Good
HG	6,568	4,332	6,091	8,783	15,927	8,096	0	686	3,185
PRD	21,182	14,840	17,165	19,894	27,548	31,564	0	0	0
CC	6,869	2,481	4,670	6,995	12,578	13,983	0	0	0
SOG	44,720	24,272	36,526	45,803	59,196	28,865	7,305	9,161	11,839
WCVI	3,508	1,144	4,013	7,188	12,648	11,930	0	0	719

Table 4: Estimated spawning stock biomass, age-4+ biomass and pre-fishery biomass for poor average and good recruitment, cutoffs based on the old 1996 estimates of B_0, and available harvest based on median values from the joint posterior distribution using the informative prior for q.

			Pre-fishery forecast biomass				**Available harvest**		
Stock	SSB	4+ Biomass	Poor	Average	Good	Cutoff	Poor	Average	Good
HG	15,202	10,080	12,917	16,623	26,056	10,700	2,217	3,325	5,211
PRD	14,859	10,272	12,132	14,262	20,908	12,100	32	2,162	4,182
CC	7,213	2,631	4,801	7,044	12,470	17,600	0	0	0
SOG	58,691	30,882	47,169	59,423	76,324	21,200	9,434	11,885	15,265
WCVI	5,187	1,691	5,745	9,593	16,057	18,800	0	0	0

Table 5: Estimated spawning stock biomass, age-4+ biomass and pre-fishery biomass for poor average and good recruitment, new cutoffs based on $0.25B_0$, and available harvest based on median values from the joint posterior distribution using the informative prior for q.

			Pre-fishery forecast biomass				**Available harvest**		
Stock	SSB	4+ Biomass	Poor	Average	Good	Cutoff	Poor	Average	Good
HG	15,202	10,080	12,917	16,623	26,056	10,244	2,583	3,325	5,211
PRD	14,859	10,272	12,132	14,262	20,908	34,362	0	0	0
CC	7,213	2,631	4,801	7,044	12,470	14,286	0	0	0
SOG	58,691	30,882	47,169	59,423	76,324	29,968	9,434	11,885	15,265
WCVI	5,187	1,691	5,745	9,593	16,057	12,988	0	0	3,068