Table of Scientific Uncertainty Buffers for Pacific Sardine[1] given a natural mortality rate of $M = 0.59$ (the rounded value from both the 2020 benchmark ($M = 0.585$) and 2022 update ($M = 0.591$)). Based upon the natural-mortality based approach suggested in Wetzel and Hamel (2023; last paragraph of Results section, bottom of page 8), one can calculate r (the annual linear increase in σ) to be:

$$r = 0.52*M*\sigma_{baseline} = 0.31*\sigma_{baseline}$$

such that:

$$\sigma_y = \sigma_{baseline}*(1 + 0.31*(y_{management} - y_{assessment})),$$

where $y_{management}$ is the year being considered for management decisions and $y_{assessment}$ is the year in which the assessment was conducted and adopted for management. Italics indicate values that exceed category 3 values for the same P*. Bold indicates applicable row for 2023.

	Category 1 (baseline σ = 0.5)				
Year P*	0.45	0.40	0.35	0.30	0.25
1	6.1%	11.9%	17.5%	23.1%	28.6%
2	7.9%	15.3%	22.3%	29.1%	35.7%
3	9.7%	18.6%	26.8%	34.6%	42.1%
4	11.4%	21.7%	31.1%	39.7%	47.8%
5	13.1%	24.7%	35.1%	44.4%	53.0%
6	14.8%	27.6%	38.8%	48.8%	57.7%
7	16.4%	30.4%	42.4%	52.8%	61.9%
8	18.1%	33.1%	45.7%	56.4%	65.7%
9	19.6%	35.6%	48.9%	59.8%	69.1%
10	21.2%	38.1%	51.8%	63.0%	72.1%
11	*22.7%*	*40.5%*	*54.6%*	*65.9%*	*74.9%*

	Category 2 (baseline σ = 1.0)				
Year P*	0.45	0.40	0.35	0.30	0.25
1	11.8%	22.4%	32.0%	40.8%	49.1%
2	**15.2%**	**28.2%**	**39.6%**	**49.7%**	**58.7%**
3	18.4%	33.7%	46.4%	57.2%	66.5%
4	21.5%	38.7%	52.5%	63.7%	72.8%
5	*24.5%*	*43.3%*	*57.8%*	*69.1%*	*77.9%*
6	*27.4%*	*47.6%*	*62.6%*	*73.7%*	*82.1%*
7	*30.2%*	*51.5%*	*66.8%*	*77.7%*	*85.5%*
8	*32.9%*	*55.2%*	*70.5%*	*81.0%*	*88.2%*
9	*35.4%*	*58.6%*	*73.8%*	*83.9%*	*90.4%*
10	*37.9%*	*61.7%*	*76.8%*	*86.3%*	*92.2%*
11	*40.3%*	*64.6%*	*79.4%*	*88.4%*	*93.7%*

	Category 3 (constant σ = 2.0)				
P*	0.45	0.40	0.35	0.30	0.25
	22.2%	39.8%	53.7%	65.0%	74.0%

[1]Developed by Owen Hamel, Northwest Fisheries Science Center

Wetzel, C.R., and Hamel, O.S. 2023. Applying a probability harvest control rule to account for increased uncertainty in setting precautionary harvest limits from past stock assessments. *Fisheries Research* 262, 106659.