

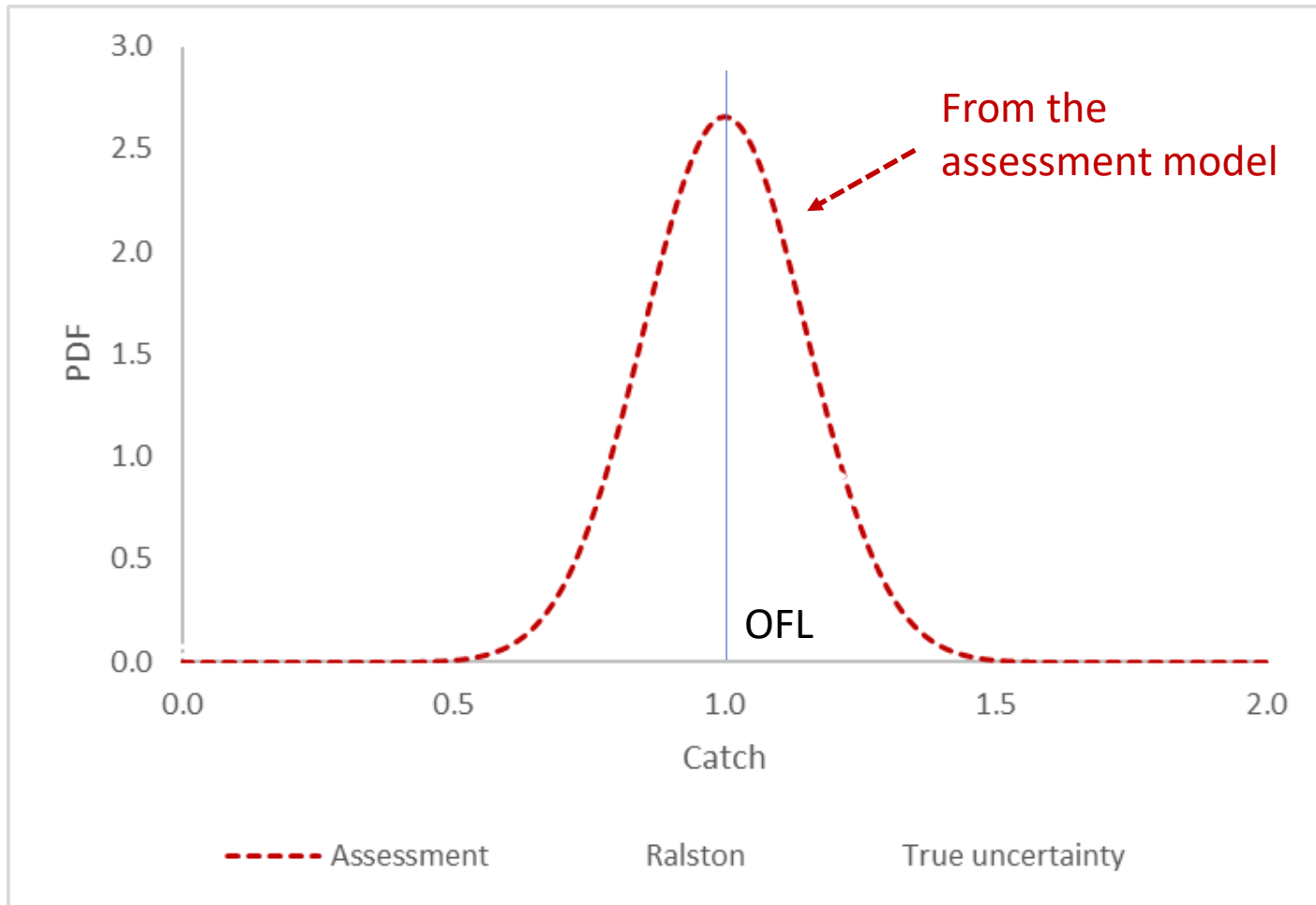
# Improving the GMFMC Tier 1 ABC Control Rule: A Perspective

Kai Lorenzen

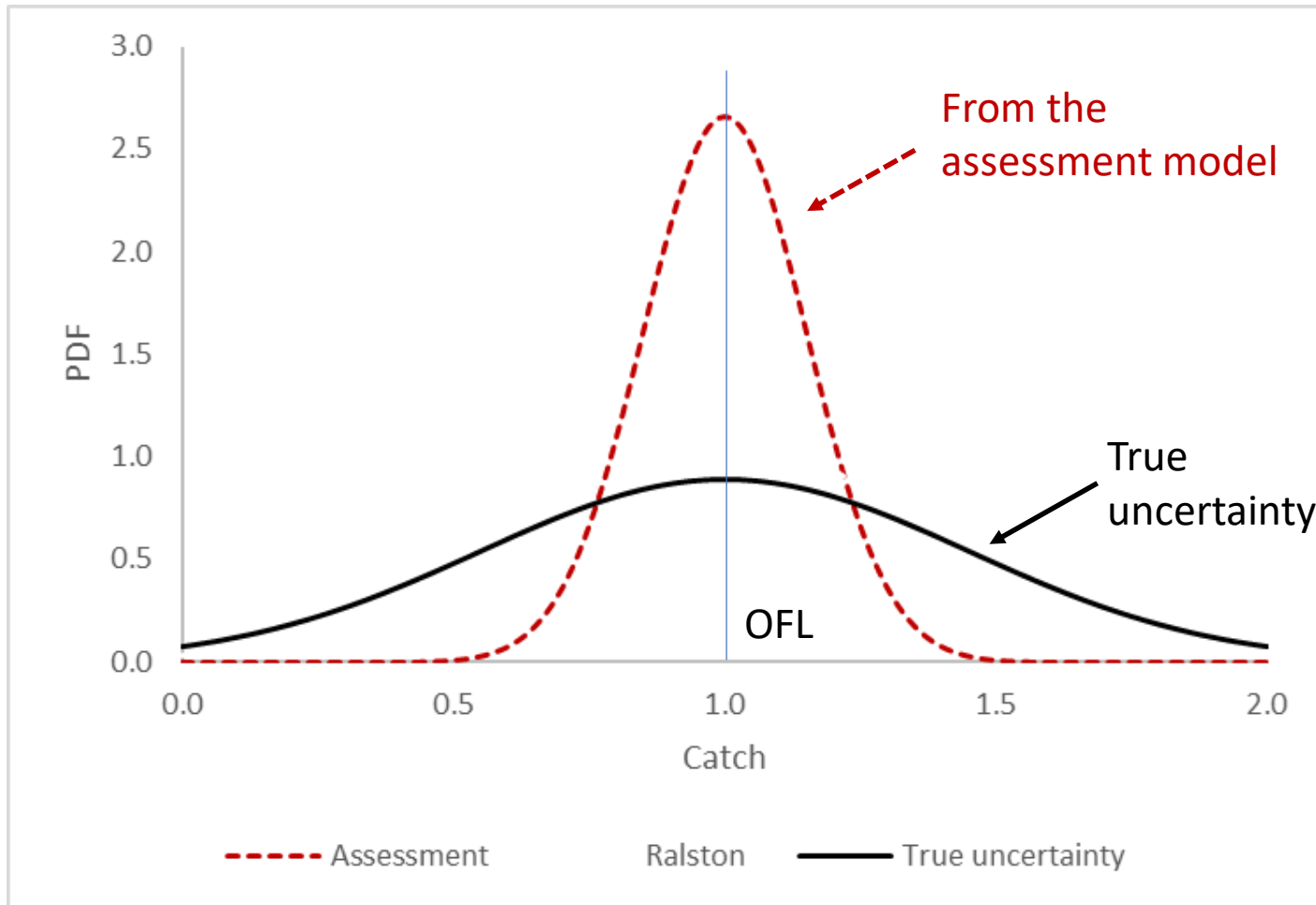
# The problem

- The ABC control rule is used to set the ABC at defined level of risk of overfishing, based on scientific uncertainty ( $\sigma$ ) and the council's risk policy ( $P^*$ )
- Most assessments underestimate scientific uncertainty ( $\sigma$ ) and therefore, the true risk of overfishing at a given ABC is higher than implied by our application of the ABC control rule
- The purpose of the revision is to better characterize true scientific uncertainty and risk of overfishing

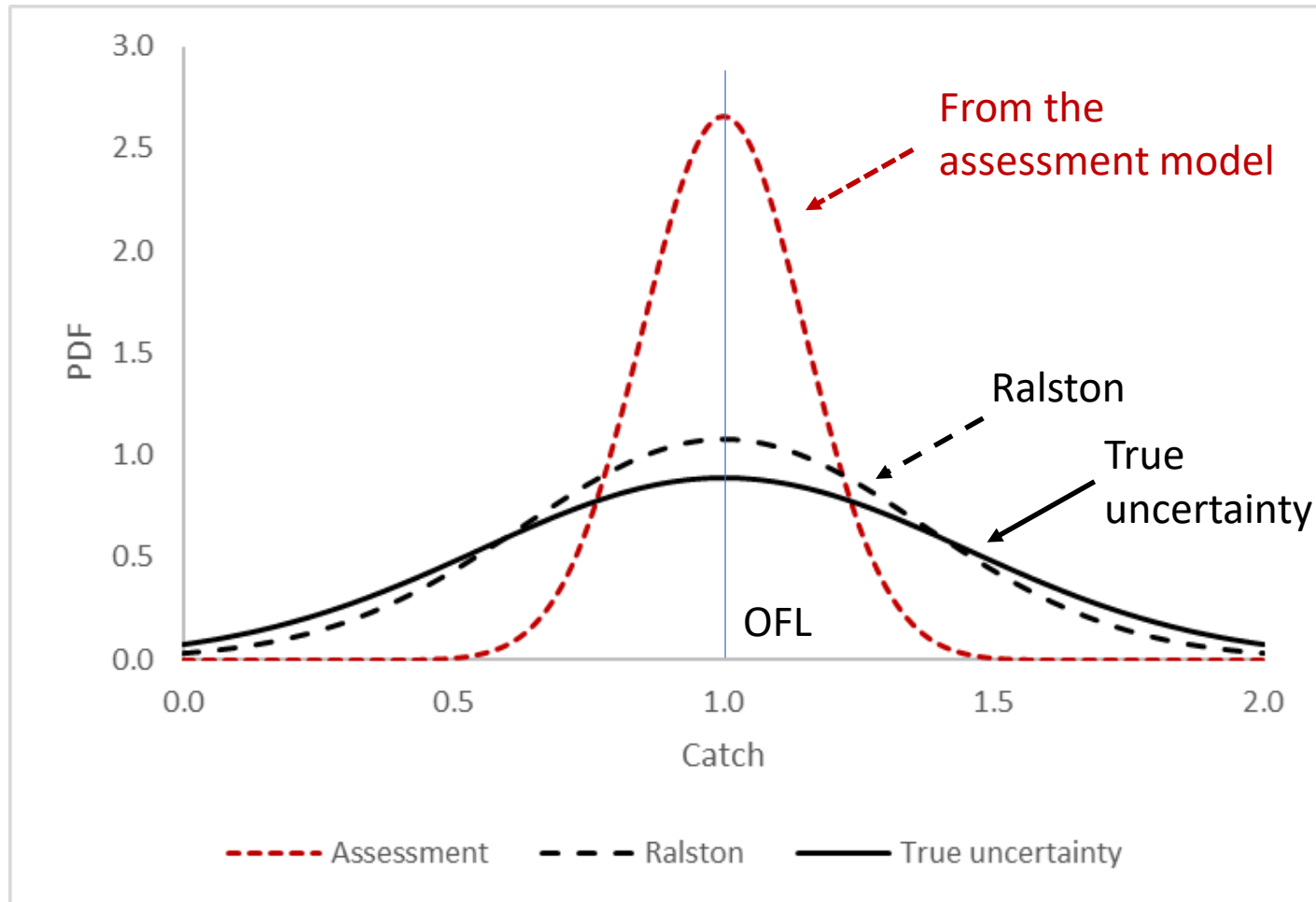
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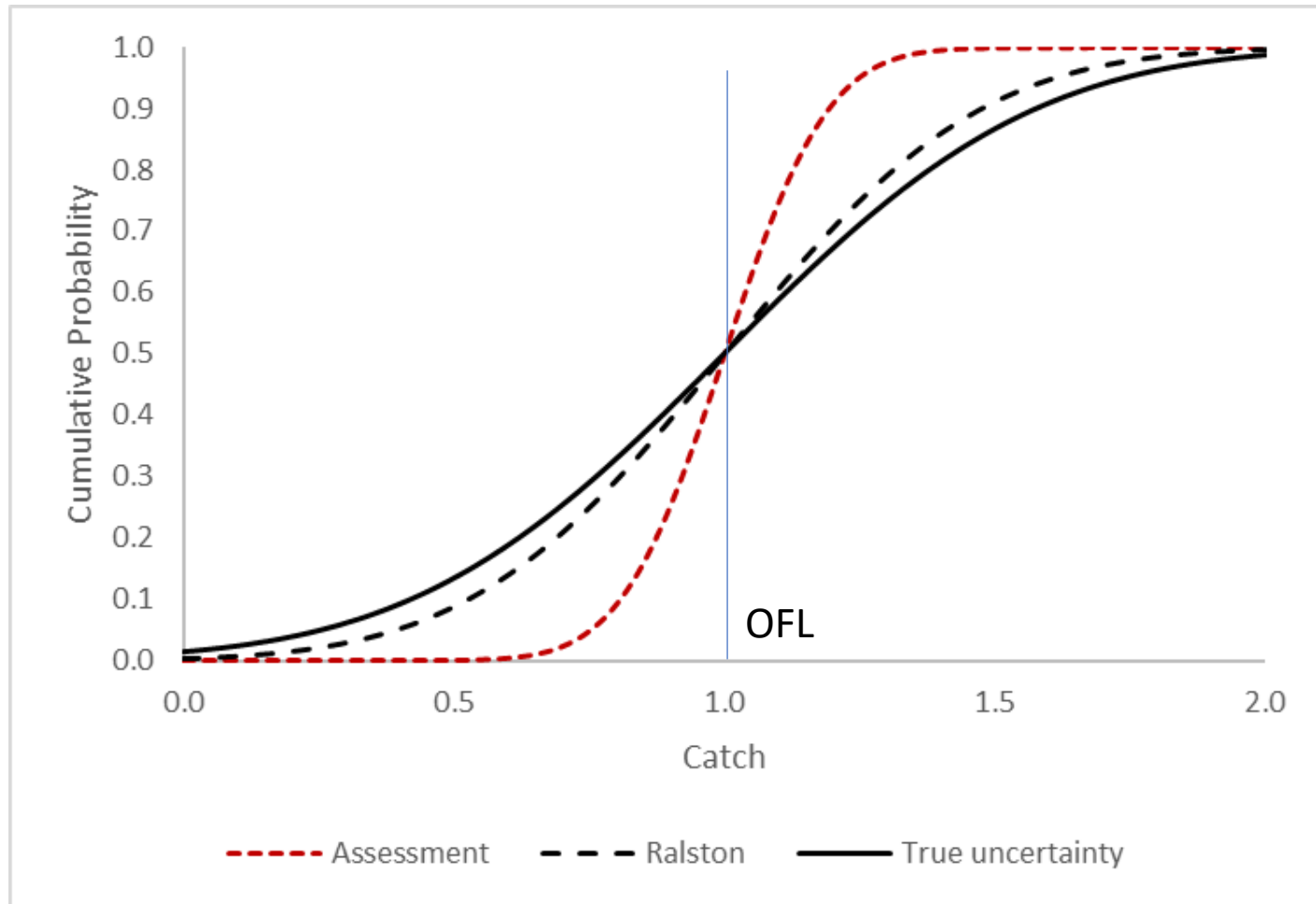
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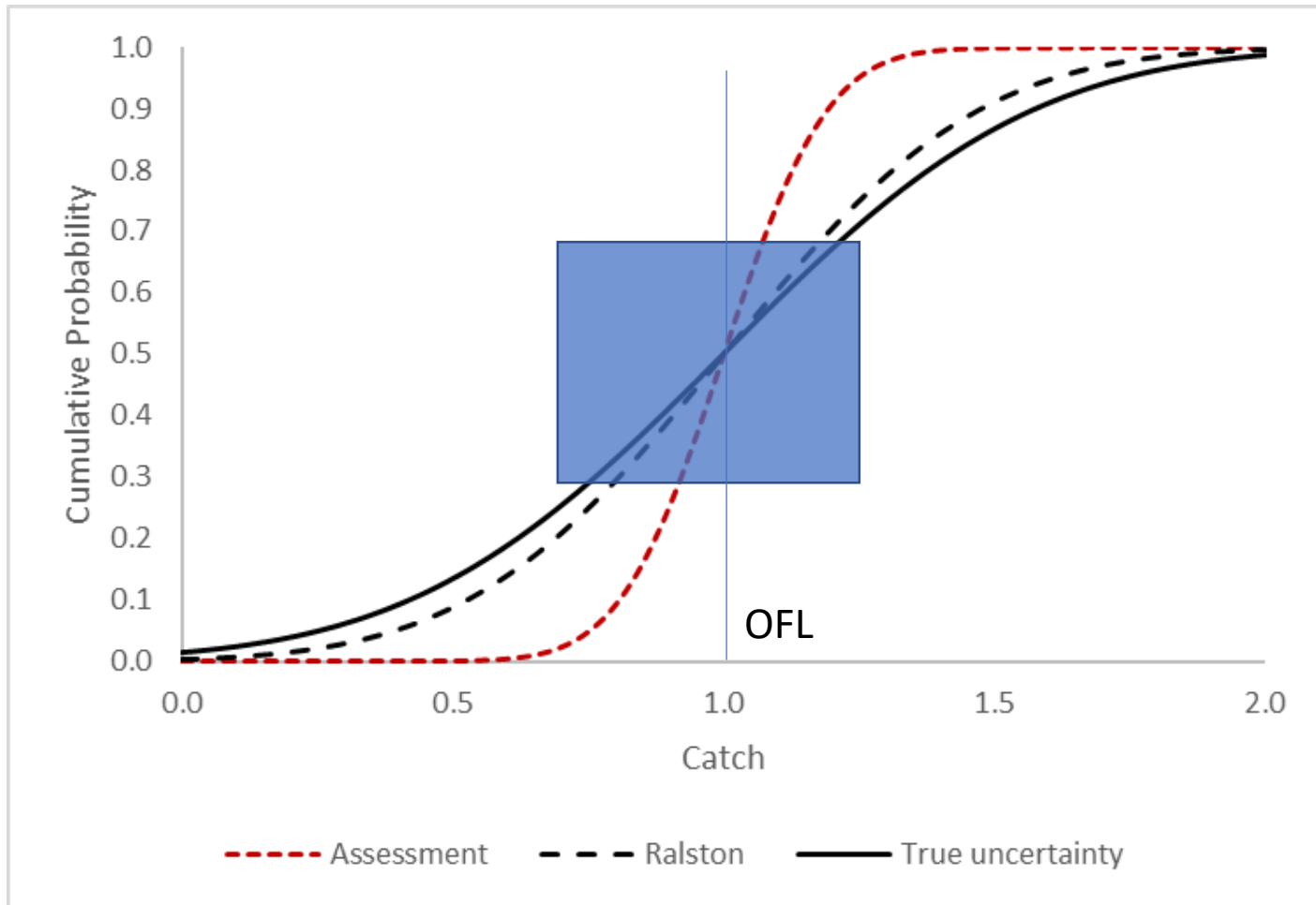
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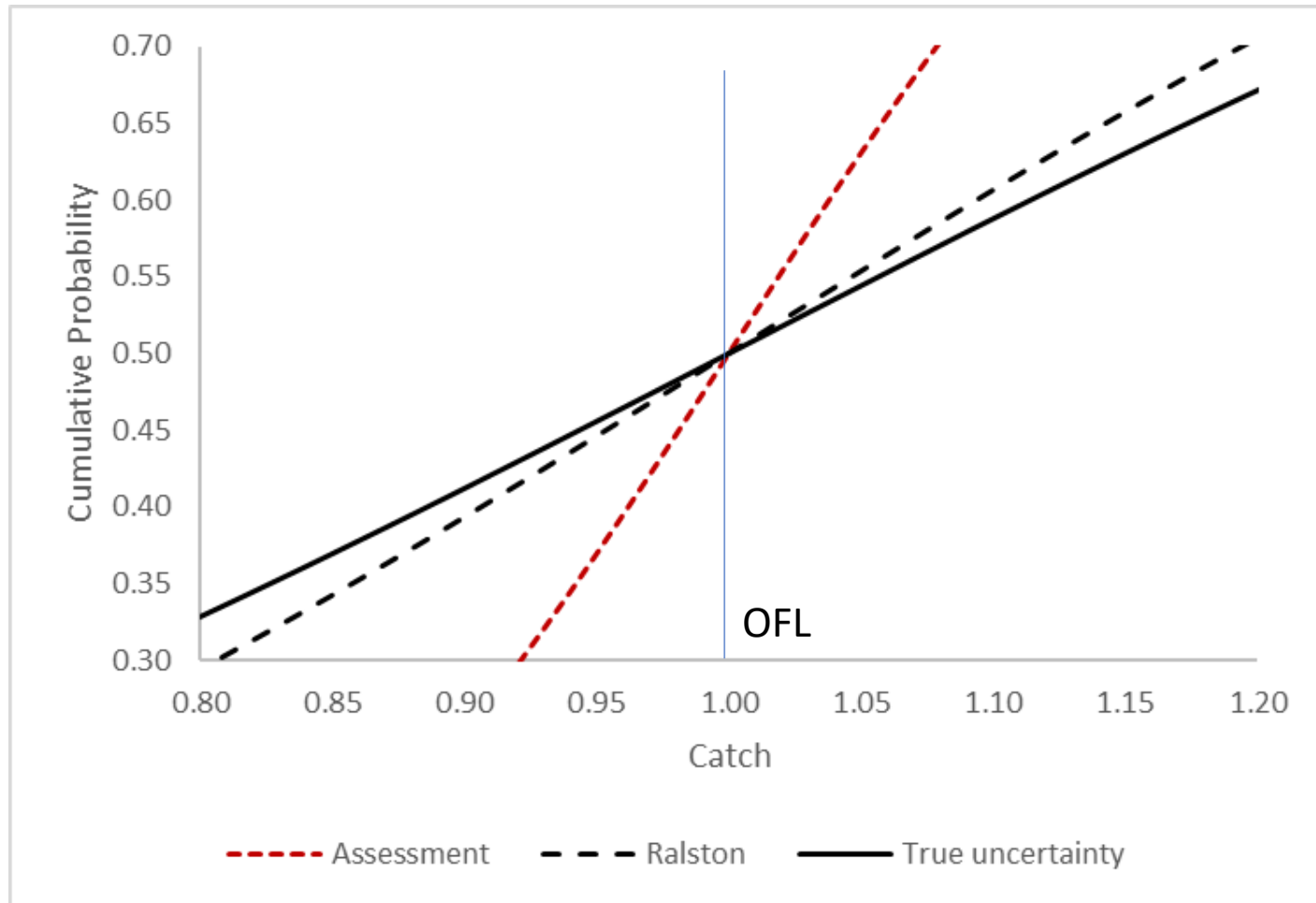
# Probability of overfishing



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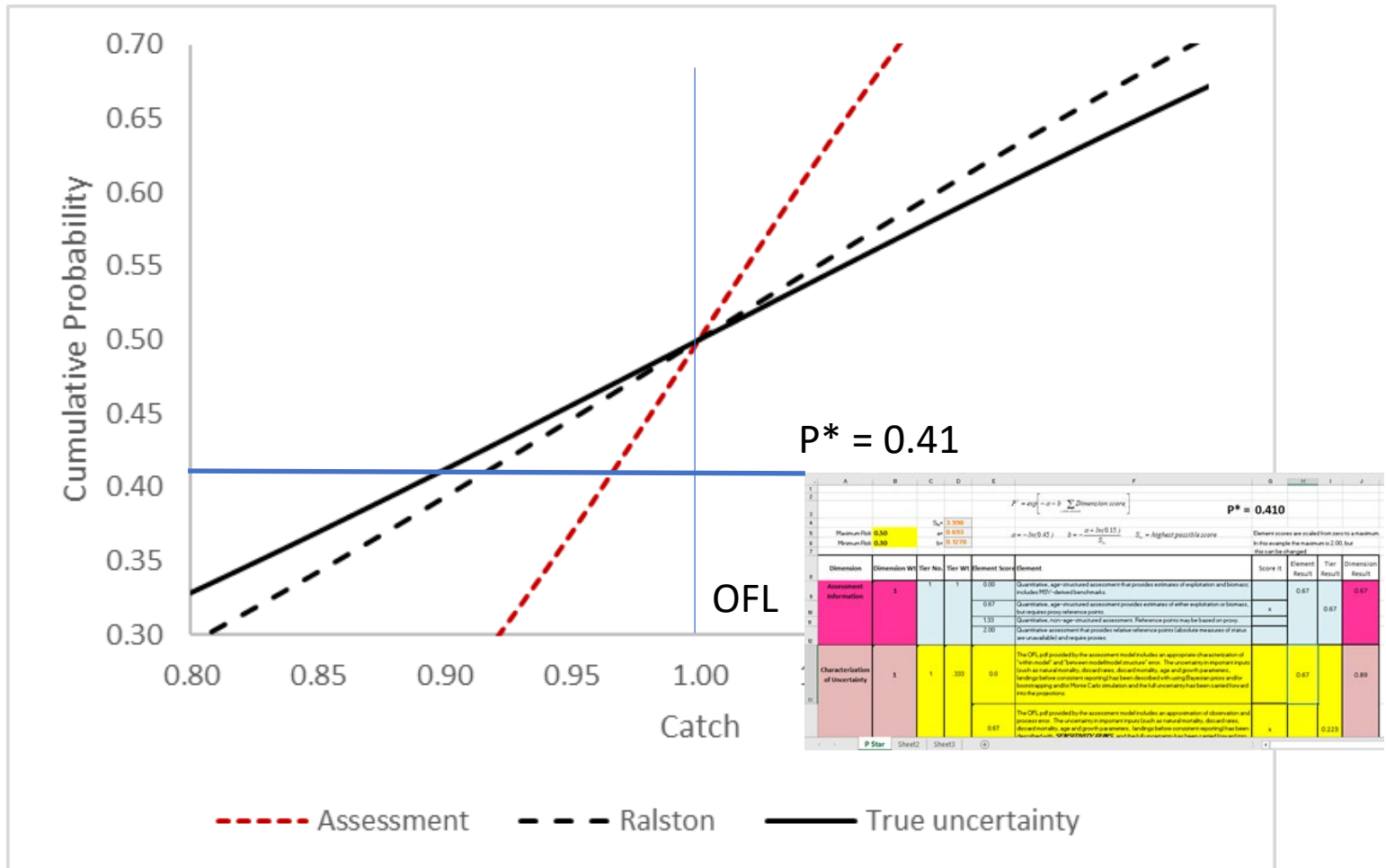


# Probability of overfishing

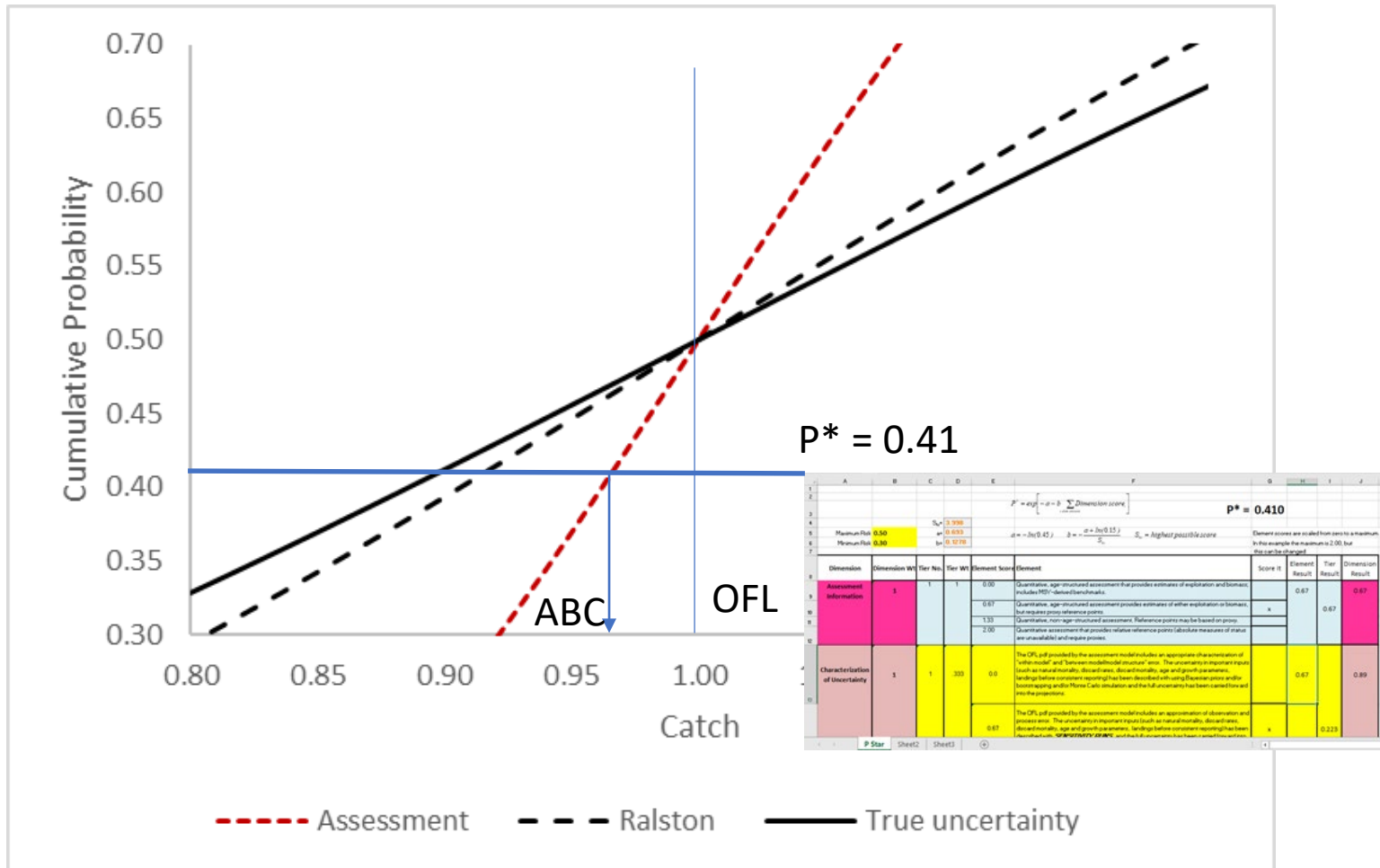




# Applying current ABC control rule



# Applying current ABC control rule



$Z = \frac{a - b}{\sqrt{\frac{a^2}{n} + \frac{b^2}{m}}}$       **P\* = 0.410**

Maximum Risk: 0.50       $\alpha = 0.050$        $\beta = 0.100$

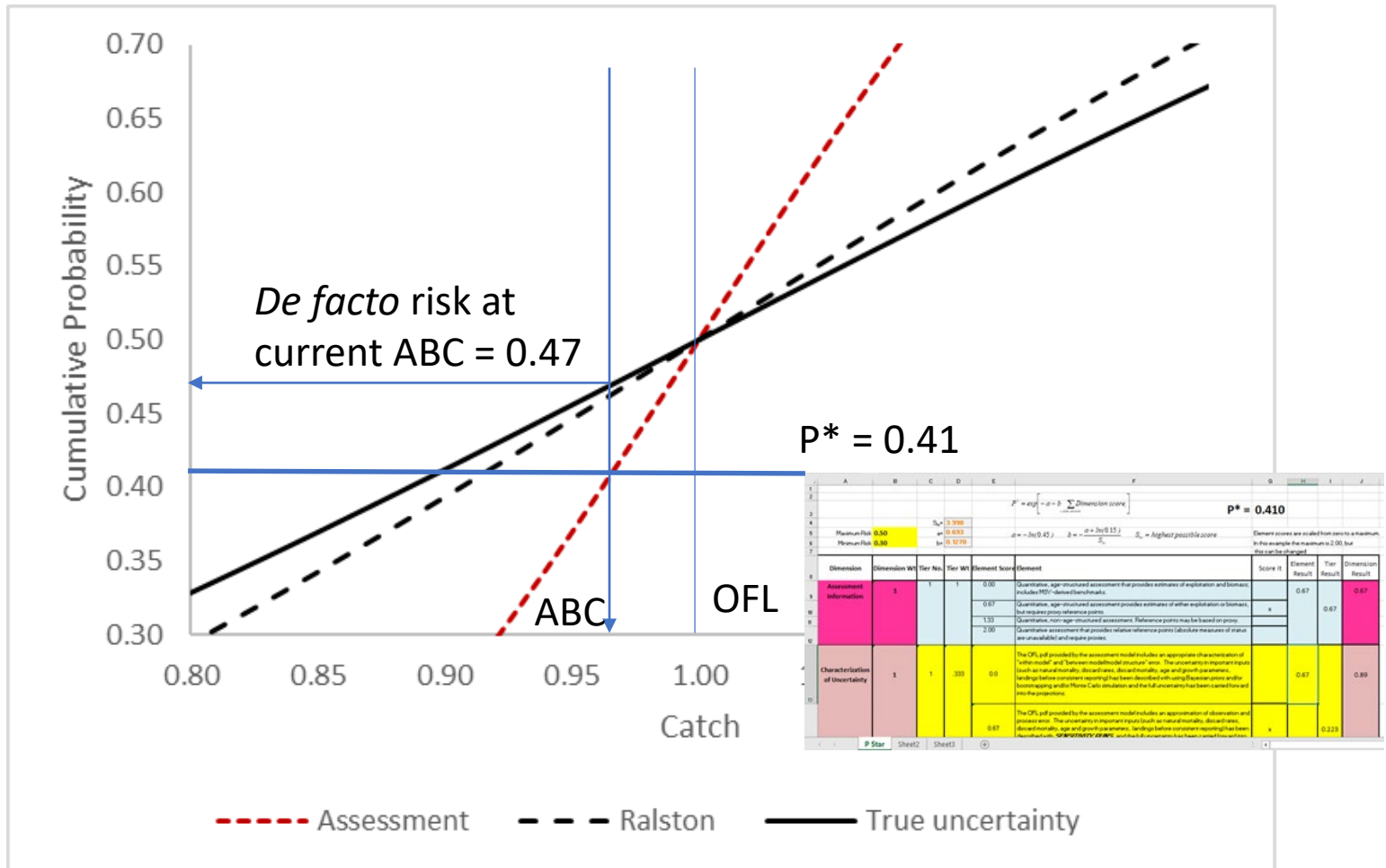
Minimum Risk: 0.30       $\alpha = 0.050$        $\beta = 0.100$

$a = 0.45$        $b = 0.55$        $S_c = \text{Highest possible score}$

Element scores are scaled from zero to a maximum. In this example the maximum is 2.00, but this can be changed.

Dimension	Dimension Wt	Tier No	Tier Wt	Element Score	Element	Score It	Element Result	Dimension Result
Assessment Information	1	1	1	0.00	Quantitative, age-structured assessment that provides estimates of exploitation and biomass, includes MSY-derived benchmarks.		0.67	0.67
				0.67	Quantitative, age-structured assessment provides estimates of either exploitation or biomass, but not both from reference points.	x	0.67	
				1.33	Quantitative, non-age-structured assessment. Reference points may be based on proxy.			
				2.00	Quantitative assessment that provides relative reference points (absolute measures of status are unavailable and/or no proxy).			
Characterization of Uncertainty	1	1	300	0.0	The OPI will provide by the assessment model includes an approximation of observation and process error. The uncertainty in input data (such as natural mortality, discard rates, recruitment, age and growth parameters, length before consistent reporting) has been described with Monte Carlo simulation and the full uncertainty has been carried forward into the presentation.		0.67	0.89
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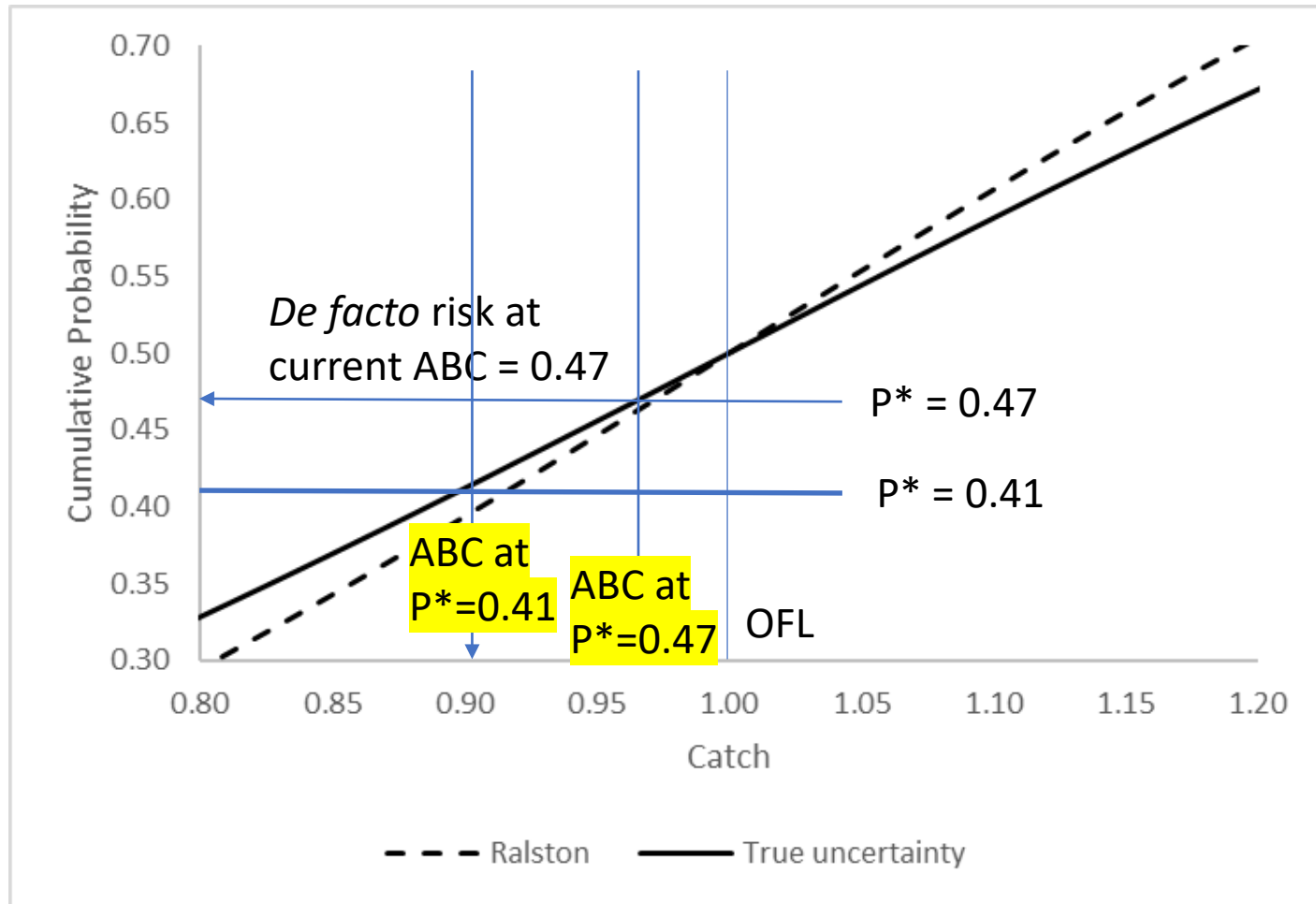
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# Applying new ABC control rule



# Options

1. Keep the ABC control rule as it is. **Consequence:** Because the uncertainty estimate is unrealistically low, the risk level greater than formally assumed.
2. Transition to new ABC control rule with Ralston  $\sigma$  as proxy for true uncertainty and keep current formal risk policy in place. **Consequence:** ABC is set approximately correctly for the intended risk level, but ABC will be lower than under the current control rule. (Better science and reduced risk in management)
3. Transition to new ABC control rule with Ralston  $\sigma$  as proxy for true uncertainty and make current de facto risk policy the formal risk policy. **Consequence:** ABC will remain approximately the same, but we will formally acknowledge the associated de facto risk levels. (Better science and no change in management)
4. Of course, the risk policy could can be amended now or later towards an intermediate solution (Better science and a compromise between reduced risk and maintaining catch levels)