

### 3.10 VPA Performance

The virtual population analysis results under the sensitivity runs (increasing the warp-impacted surveys by arbitrary levels of 10%, 25% and 100%) were examined for signs of improved fit relative to the base run. If in fact the warp-impacted surveys were catching fewer fish than expected, an improved fit and decrease of residuals would be expected under the sensitivity runs. However, of eight stocks examined, five decreased in fit, one remain unchanged, and two improved (Table 3.10.1). On average, the fit remain unchanged for the 10% run, decreased by 1% for the 25% run, and decreased by 4% for the 100% run. The overall fits of the virtual population analyses do not indicate a loss of fish in the warp impacted surveys.

The VPA performance was further examined by comparing the survey and year specific residuals from the sensitivity runs with the base case for each stock. These changes in residual were plotted so that positive values denote an improvement in fit while negative values denote a decrease in fit. Note that due to the backward convergence of VPA these changes will decrease for earlier years. If in fact the warp impacted surveys catch fewer fish than expected, trends in the residuals should be seen, viz., more positive changes than negative ones, especially for the impacted surveys. However, examination of these changes in residuals resulted in either random patterns or sets of decreased fits that were not balanced by associated increased fits. As the warp impacted surveys were increased, the magnitude of change in the residuals increased, as expected, but did not produce more positive changes than negative ones for either all indices or the warp-impacted survey indices taken alone. The changes in residuals from the sensitivity VPA runs do not indicate a loss of fish in the impacted surveys.

Retrospective patterns are common in VPA results and were seen for many of these stocks. If the warp impacted surveys were catching fewer fish than expected, a decrease in retrospective pattern would be expected under the sensitivity runs. However, the sensitivity runs had similar retrospective patterns to the base case for those stocks examined. The changes in retrospective patterns do not indicate a loss of fish in the impacted surveys.

Table 3.10.1 Mean square residual and change in mean square residual relative to the base run (positive values denote an improved fit) from eight stocks assessed with VPA. The three sensitivity analyses correspond to increasing the warp impacted surveys by 10%, 25% and 100%.

	Mean Square Residual			
	base	x1.10	x1.25	x2.00
GBCod	0.58880	0.58822	0.58839	0.59875
GBHaddock	0.69544	0.69435	0.69402	0.70135
GBYTF	0.71389	0.71046	0.70664	0.70068
SNEYTF	1.07064	1.07141	1.07089	1.07124
CCYTF	0.82761	0.83632	0.84960	0.90921
GOMCod	0.44121	0.44242	0.44498	0.46370
Witch	0.76730	0.76576	0.76248	0.75622
Plaice	0.38929	0.39456	0.40283	0.44496

	Relative Change in Mean Square Residual		
	x1.10	x1.25	x2.00
GBCod	0%	0%	-2%
GBHaddock	0%	0%	-1%
GBYTF	0%	1%	2%
SNEYTF	0%	0%	0%
CCYTF	-1%	-3%	-10%
GOMCod	0%	-1%	-5%
Witch	0%	1%	1%
Plaice	-1%	-3%	-14%
average	0%	-1%	-4%