3.8 Changes in Abundance Indices Pre- and Post Warp Intervention

Various abundance indices using the *Albatross IV* survey vessel are available for all 20 of the stocks assessed in section 2 of this document. Surveys potentially influenced by the warp offsets include the winter, spring and autumn bottom trawl time series. Overall there are 39 trawl survey series that are used in the assessments of the 20 stocks (Table 3.8). This analysis considers patterns in the directional change (positive, negative or the same) for each stock and survey series in pairs of adjacent years (e.g., 1998 to 1999, 1999 to 2000, etc.) to determine whether there are patterns in proportions of stocks increasing, decreasing or remaining the same associated with the warp offset intervention. The absolute abundance change from one year to the next is confounded by the underlying abundance changes in the stocks under consideration. The directional analysis, however, is likely more robust to the confounding influences of stock size changes in looking for potential interventions in the data series.

The directional changes for each stock and survey series (+, - or no change) are compiled in Table 3.8. Overall there were 25 series showing positive changes in stock abundance indices from 1998 to 1999, and 14 stocks showing stock declines. The potential intervention due to trawl warp offsets would have been manifested in the directional changes between 1999 and 2000. In that pair of years, the proportion of stocks showing positive changes was nearly identical to that in the previous year (23 of 39 stocks), with 15 showing a decline and one unchanged (Figure 3.8). For the years 2000-2001 and 2001-2002 the intervention would have been included in both years, so there would be no expected decline in the proportion of increasing/declining stocks due to the potential effects of the warp offsets. Interestingly, in 2000/2001, the proportion of declining versus increasing stocks reversed from the previous years, suggesting a year effect in these data. In 2001-2002 (winter and spring indices only), increasing stocks again dominated the total (12/17).

The overall patterns of increasing/declining stocks in the "intervention" year was thus very similar to the year previous, suggesting no systematic pattern of reduced catch efficiency that would be great enough to be discerned in such analyses. Based on the degree of warp offset by fishing depth, if such an intervention were to influence abundance indices, the effect would likely be most pronounced for the deepest dwelling species (i.e., where the warp offset was greatest). The deepest-dwelling of the groundfish stocks considered (based on catch-weighted median depths at capture, section 3.7) are American plaice, pollock, witch flounder, white hake, and redfish. There are nine survey series used in the assessments of these five stocks (Table 3.8). Data from the intervention year (i.e., 1999-2000) indicate that in 8 of these 9 series, the direction of change in abundance indices was actually positive (pollock in the autumn survey was the only negative change for the five stocks). Thus, analysis does not suggest a strong year effect coincident with a trawl warp offset intervention.

Table 3.8. Directional change in abundance (numbers per tow) of various species/stocks for pairs of years. For each stock all tuning indices used in the assessment that were influenced by the warp offsets in 2000-2002 are included. Positive (+) changes between years indicates the index increased. The warp change on Albatross occurred between 1999 and 2000.

Stock/Species	Surveys Series	1998-1999	1999-2000	2000-2001	2001-2002
GB Cod	Spring	-	+	-	+
	Fall	-	+	-	
GB Haddock	Spring	+	-	+	+
	Fall	+	-	+	
GB Yellowtail	Spring	+	-	-	+
	Fall	+	-	+	
SNE Yellowtail	Spring	+	-	-	+
	Fall	-	+	-	
	Winter	+	-	+	-
CC Yellowtail	Spring	+	+	-	+
	Fall	+	-	-	
GM Cod	Spring	+	+	-	+
	Fall	+	+	-	
Witch	Spring	-	+	+	+
	Fall	+	+	+	
Plaice	Spring	-	+	+	-
	Fall	+	+	-	
GB Winter Flounder	Spring	+	+	-	+
	Fall	-	+	+	
SNE Winter Flounder	Spring	+	-	-	+
	Fall	-	+	-	
	Winter	+	-	-	-
White hake	Spring	+	+	-	+
	Fall	+	+	-	
Pollock	Spring	-	+	+	
	Fall	+	-	+	
Redfish	Fall	-	+	-	
Ocean Pout	Spring	+	-	+	-
N Windowpane	Fall	-	o	+	
S Windowpane	Fall	-	+	+	
MAB Yellowtail	Spring	+	-	-	
	Fall	-	+	-	
	Winter	-	+	-	
GM Haddock	Spring	+	-	-	+
	Fall	+	+	-	
Atlantic Halibut	Spring	+	-	+	-
	Fall	-	-	-	
GM Winter Flounder	Spring	+	+	-	+
	Fall	+	+	-	
Sum Increases (+)		25	23	14	12
Sum Decreases (-)		14	15	25	5
Sum No Change (o)		0	1	0	0

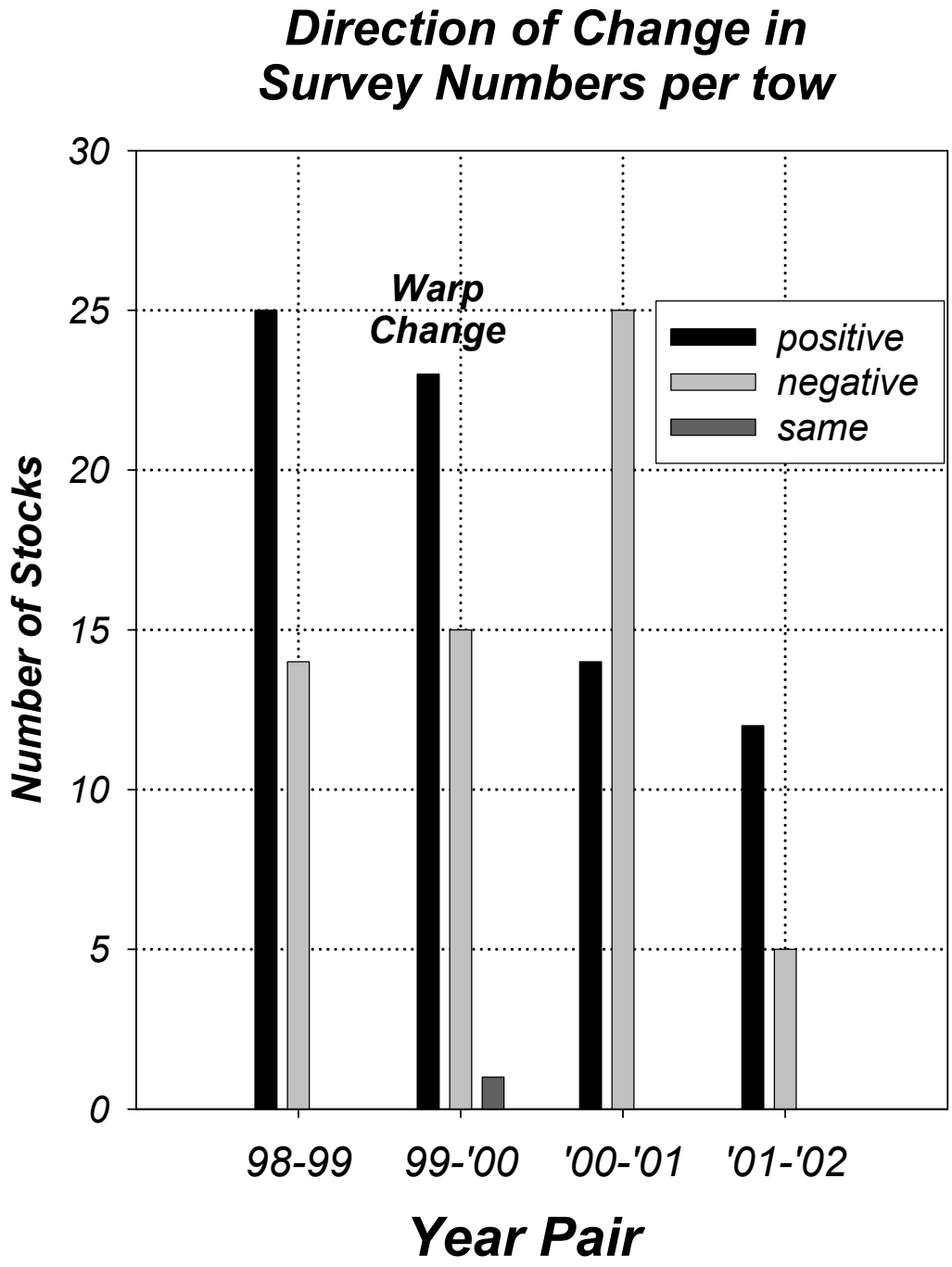

Figure 3.8. Directional change in abundance (numbers per tow) of various species/stocks for pairs of years. For each stock all tuning indices used in the assessment that were influenced by the warp offsets in 2000-2002 are included. Positive changes between years indicates the index increased. The warp change on *Albatross* occurred between 1999 and 2000.