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APPROXIMATE CONFIDENCE INTERVALS FOR NUMERICAL VERIFICATION CRITERIA USED IN HYDROLOGICAL MODELS. APPLICATION TO THE WMO INTERCOMPARISON OF CONCEPTUAL MODELS OF SNOWMELT RUNOFF

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1. INTRODUCTION

During the period 1978-1983 the World Meteorological Organization (WMO) carried out an international intercomparison of conceptual models of snowmelt runoff [WMO, 1982].

The aims of the project were:

- to assemble information on existing models used operationally to estimate snowmelt runoff;

- to compare snowmelt runoff models with regard to their structure, conceptual basis and data needs;

- to evaluate and obtain an insight into their performance and accuracy of estimation, and

- to disseminate the information and results obtained so as to popularize new approaches to forecasting snowmelt runoff and assist countries in the selection and application of models for this purpose.

Ten models submitted by seven countries were included in the project and fitted to six standard data sets submitted by six countries.

Each data set comprises a six-year calibration period and a four year verification period. Graphical and numerical verification criteria were used to analyse the results of the models; the final report is in preparation and will be published by WMO.

The participants of the technical conference held in Norrköping, Sweden on September 26-30, 1983 expressed the opinion that it would be desirable to estimate confidence intervals for the values of the verification criteria in order to determine whether the differences between the criterion values are significant or the result of sampling variations.

At the conference, it was decided that, in addition to the values based on the entire calibration and verification periods and the snowmelt seasons, annual values should be computed as well for the criteria R, NTD, S and NS.

In this report, we used these criteria, which are defined as follows:

- Ratio of the mean error to the mean observed discharge:

$$R = \frac{\Sigma(y_c - y_o)}{n\,\bar{y}_o}$$

- One minus ratio of the sum of squares of the daily residuals to the centered sum of squares of the daily observed discharges:

$$NTD = \frac{\Sigma(y_o - \bar{y}_o)^2 - \Sigma(y_c - y_o)^2}{\Sigma(y_o - \bar{y}_o)^2} \quad \text{for mean daily discharges}$$

- Ratio of the standard deviation of the residuals to the mean observed discharge:

$$S = \frac{\sqrt{\left[\frac{\Sigma(y_c - y_o)^2}{n}\right]}}{\bar{y}_o}$$

- Coefficient of gain from daily means:

$$NS = \frac{\Sigma(y_o - \bar{y}_{od})^2 - \Sigma(y_c - y_o)^2}{\Sigma(y_o - \bar{y}_{od})^2}$$

In the above equations: y_o : observed discharge; y_c : computed discharge; n : total number of observations; $\bar{y}_{od}$: mean daily observed discharge for each day of the year derived from the calibration period.

The models and the basins used in the Intercomparison Project are given in the following table:

BASINS	MODELS	
	MODEL	ABBREVIATION IN THIS REPORT
Durance (France)	UBC	UBC
W3 (U.S.A.)	CEQUEAU	CEQ
Dunajec (Poland)	ERM	ERM
Dischma (Switzerland)	NAM-II	NAM
Illecillewaet (Canada)	TANK	TAN
Kultsjon (Sweden)	HBV	HBV
	SRM	SRM
	SSARR	SSA
	PRMS	PRM
	NWSRFS	NWS
	DAILY MEAN ("Peasant")*	DAY

* This "model" was not included in the intercomparison project. It consists of the mean daily observed discharge for each day of the year derived from the calibration period.

TABLE 1. ANNUAL CRITERION VALUES

NTD

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

		URC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.929	.921	.812	.954	.896	.937	-1.000	.904	.920	.957	.844
CAL	70-71	.896	.910	.815	.894	.935	.860	-1.000	.881	.836	.910	.793
CAL	71-72	.881	.925	.750	.901	.928	.891	-1.000	.906	.853	.909	.798
CAL	72-73	.912	.641	.692	.837	.804	.686	-1.000	.921	.685	.921	.700
CAL	73-74	.875	.784	.637	.883	.919	.856	-1.000	.876	.880	.863	.804
CAL	74-75	.862	.834	.642	.877	.823	.875	.934	.893	.684	.808	.732
VER	75-76	.357	.316	-.780	.784	.688	.845	.837	.838	.323	.742	-1.009
VER	76-77	.873	.884	.700	.860	.884	.816	.805	.897	.756	.939	.462
VER	77-78	.804	.867	.595	.820	.825	.922	.893	.822	.624	.920	.485
VER	78-79	.961	.935	.797	.875	.972	.922	.845	.916	.880	.929	.774

SNOWMELT SEASON

CAL	69-70	.877	.924	.833	.977	.862	.914	-1.000	.833	.897	.928	.697
CAL	70-71	.852	.837	.807	.836	.847	.578	-1.000	.696	.567	.780	.438
CAL	71-72	.737	.889	.561	.873	.888	.750	-1.000	.780	.729	.880	.522
CAL	72-73	.884	.398	.621	.827	.746	.447	-1.000	.880	.477	.890	.469
CAL	73-74	.850	.691	.584	.833	.862	.719	-1.000	.793	.796	.758	.695
CAL	74-75	.709	.696	.363	.826	.586	.762	.907	.821	.437	.660	.391
VER	75-76	-.898	-.371	-4.817	.727	.321	.821	.814	.732	-.728	.379	-3.612
VER	76-77	.684	.881	.282	.936	.832	.759	.874	.822	.622	.924	-.159
VER	77-78	.826	.881	.399	.889	.734	.901	.925	.693	.690	.904	.328
VER	78-79	.939	.952	.764	.943	.963	.883	.726	.872	.835	.967	.581

As a first step the annual values of the criteria defined above were studied. The annual values of the criteria for all basins, periods and seasons are given in Appendices A and B. As an example, Table 1 and Figure 1 give the values of the criterion NTD for the Durance River. The value (-1.000) denotes that the model has not been tested in a given case.

In Figure 1, each asterisk represents the annual value of the criterion for the calibration and verification periods. If the annual value is the same for more than one year, the asterisk is replaced by a digit showing the number of repetitions. The symbol "I" indicates that at least one annual value is outside the range of the scale.

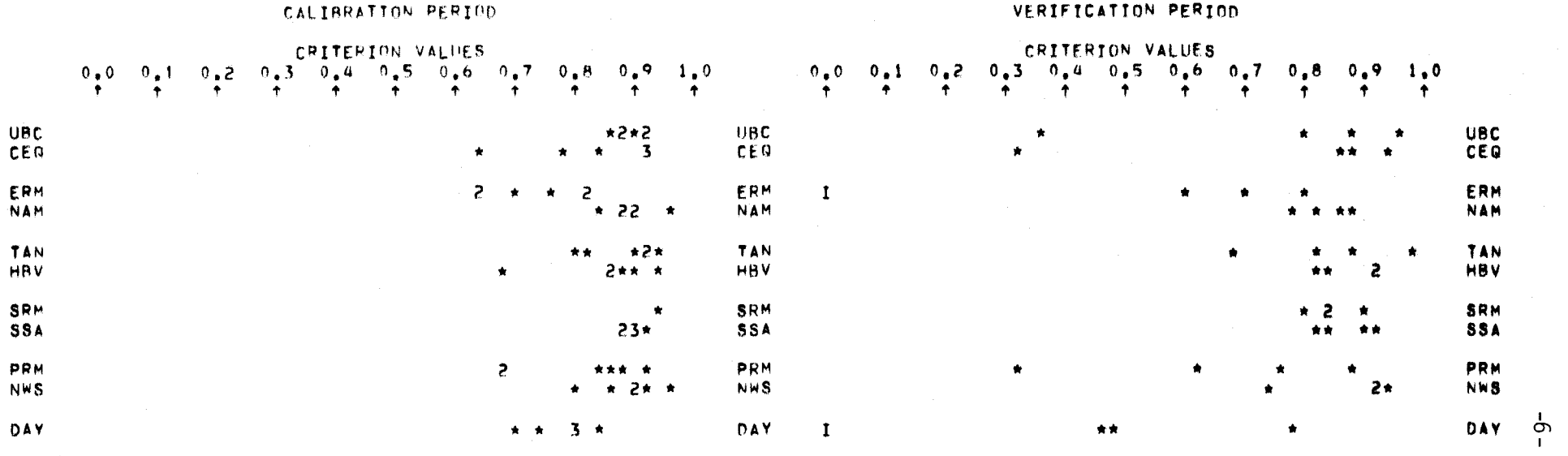
An examination of the tables and graphs indicates that criterion values vary for different years and models. There is an overlap between the range of the annual values of the criteria for different models which indicates that the difference between criterion values may be due to sampling variation and therefore it would be useful to compute confidence intervals. In this connection, it is interesting to note that the dispersion of the criterion values of a given model for different years is an indication of the consistency of its performance.

FIGURE 1. ANNUAL CRITERION VALUES

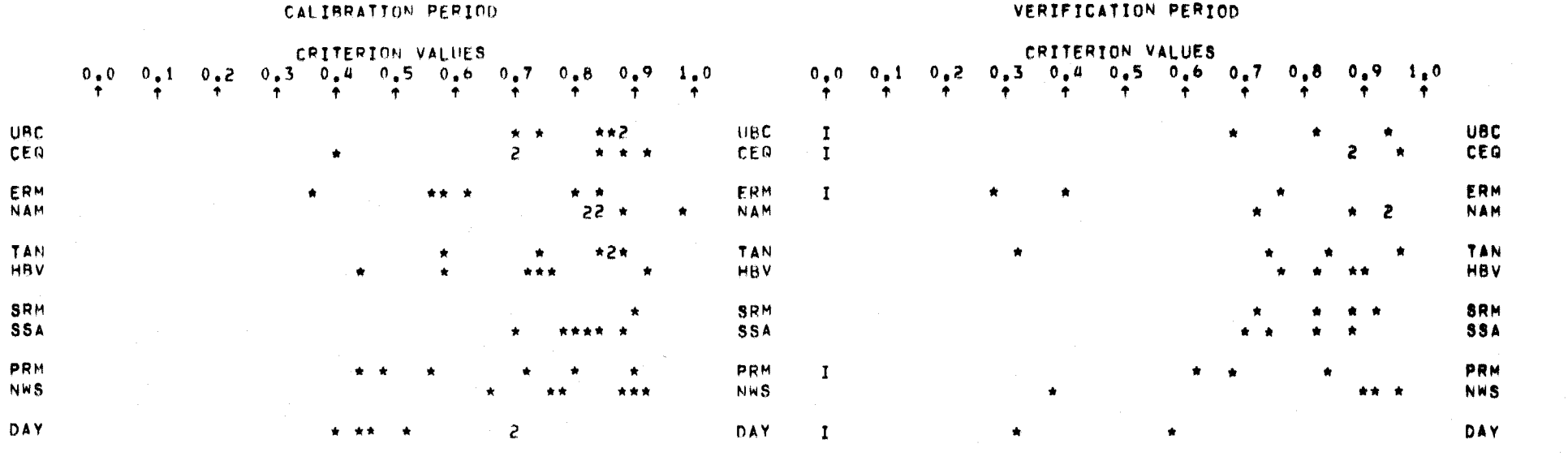
NTD

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



SNOWMELT SEASON



The verification criteria are complicated functions of the observed and estimated flows and therefore the computation of exact confidence intervals is mathematically intractable. In this report, two different approaches were used to compute approximate confidence intervals.

The first approach is the standard two-way analysis of variance and the second is the Jackknife statistic which is of general applicability.

It must be noted that confidence intervals for the criterion values were also computed using Friedman's (Hollander and Wolfe, 1973) non-parametric two-way analysis of variance method. The results of this computation were less sensitive in discriminating between model performances than both the ordinary Anova and the Jackknife statistic and therefore they are not included.

2. ESTIMATION OF CONFIDENCE INTERVALS

2.1 Two-way analysis of variance

A two-way analysis of variance can be used to determine the effects of the years and the models on the values V_{ij} of the verification criterion V where (i) represents the year and (j) represents the model. It must be noted however, that in our case, as is apparent from the graphs of the

previous section, the basic assumptions of the analysis of variance (homoscedasticity, independence and normality of residuals) are not satisfied in most cases. In addition, confidence intervals computed by the standard two-way Anova are based on the pooled standard deviation and therefore cannot take into account the differences in dispersion between models and can only give an indication of the size of the confidence intervals.

Table 2 shows the results of a two-way analysis of variance for the criterion NTD of the annual values of Table 1 and the 95% confidence intervals based on the pooled standard deviation.

Figure 2 shows in graphical form the confidence intervals of Table 2. On this graph, "$\bar{V}$" represents the arithmetic mean of the annual values of the criterion.

It must be noted that the confidence intervals in the figures are cut-off if the upper or lower limit of the interval is outside the range of the scale. This is indicated by the symbol "I".

Figure 2 shows that the confidence intervals for NTD are very wide for the verification period. This is due to the fact that the pooled standard deviation is influenced strongly by models with high variability of the NTD values.

TABLE 2. 95% CONFIDENCE INTERVALS BASED ON TWO-WAY ANOVA

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}$	.0517	.0517	.0517	.0517	.0517	.0517	-1.0000	.0517	.0517	.0517	.0517
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.849	.793	.681	.847	.841	.807	-1.000	.853	.766	.851	.735
$\bar{V}$	.892	.836	.724	.890	.884	.850	-1.000	.896	.809	.894	.778
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	.935	.879	.767	.933	.927	.893	-1.000	.939	.852	.937	.821

VERIFICATION PERIOD

$\hat{\sigma}$	.2859	.2859	.2859	.2859	.2859	.2859	.2859	.2859	.2859	.2859	.2859
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.456	.458	.036	.543	.550	.584	.553	.576	.354	.590	-.114
$\bar{V}$	.748	.750	.328	.835	.842	.876	.845	.868	.646	.882	.178
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	1.040	1.042	.620	1.127	1.134	1.168	1.137	1.160	.938	1.174	.470

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}$	.1086	.1086	.1086	.1086	.1086	.1086	-1.0000	.1086	.1086	.1086	.1086
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.729	.650	.539	.873	.709	.606	-1.000	.711	.561	.727	.446
$\bar{V}$	.818	.739	.628	.962	.798	.695	-1.000	.800	.650	.816	.535
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	.907	.828	.717	1.051	.887	.784	-1.000	.889	.739	.905	.624

VERIFICATION PERIOD

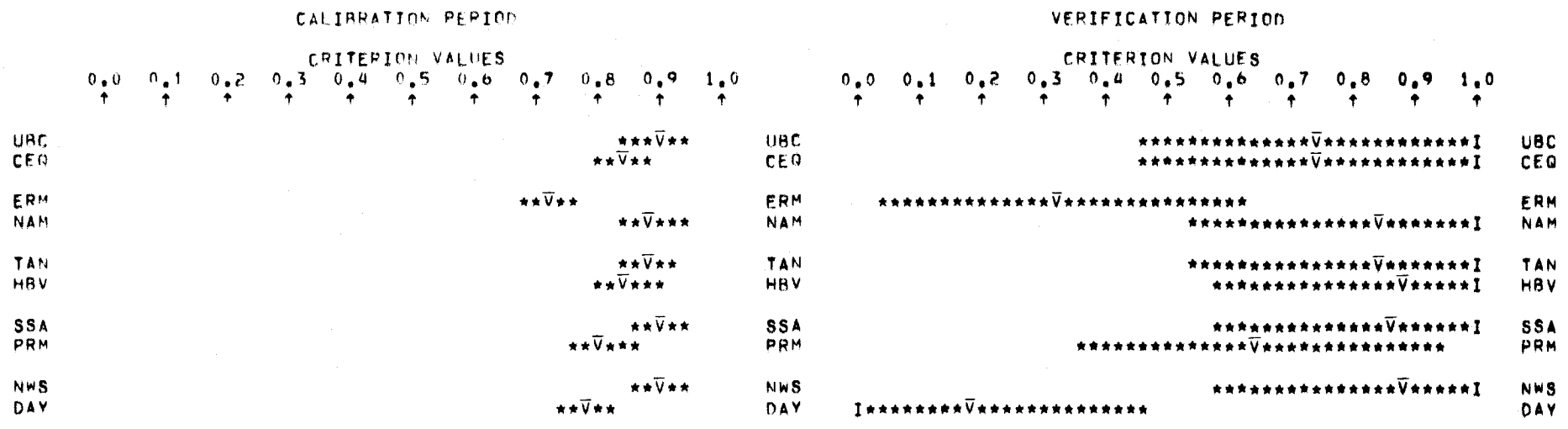
$\hat{\sigma}$	.8711	.8711	.8711	.8711	.8711	.8711	.8711	.8711	.8711	.8711	.8711
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	-.502	-.303	-1.731	-.015	-.177	-.048	-.055	-.109	-.535	-.096	-1.604
$\bar{V}$	.387	.586	-.842	.874	.712	.841	.834	.780	.354	.793	-.715
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	1.276	1.475	.047	1.763	1.601	1.730	1.723	1.669	1.243	1.682	.174

$\hat{\sigma} = \sqrt{\text{residual mean square}}$
d = degrees of freedom
$\bar{V}$ = is the arithmetic mean of the annual values

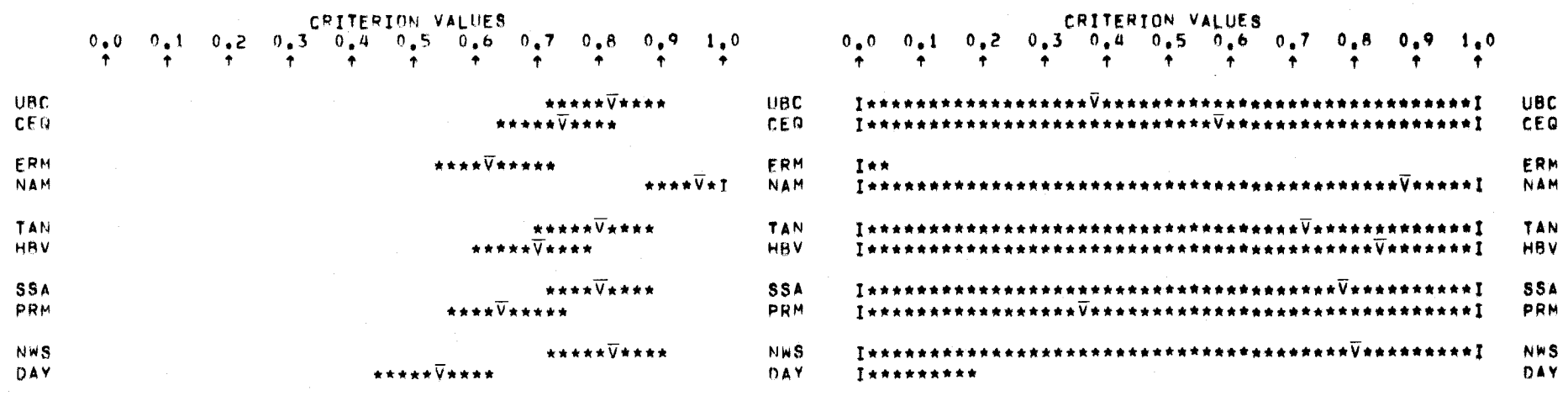
FIGURE 2. 95% CONFIDENCE INTERVALS BASED ON TWO-WAY ANOVA

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



SNOWMELT SEASON



This is a serious limitation of the standard two-way ANOVA approach.

Given that the confidence intervals for NTD are very wide it was considered useful to include the corresponding tables and graphs for the criterion S which has a smaller variability (Table 3, Figure 3).

Based on the confidence intervals already computed, we can determine groups of models which are not significantly different, i.e. the lower NTD values are within the confidence interval of the higher NTD values.

Figure 4 shows groups of models whose NTD values are not significantly different. The figure should be read from the higher to the lower values of NTD. For example, for the calibration period (complete year), the models TANK, NAM-II, UBC and NWSRFS are within the confidence interval of the best model (SSARR). Figure 5 shows the corresponding results for the criterion S.

The above computations were carried out for all basins, criteria, periods and seasons. The results show that the confidence intervals based on the pooled standard deviation are not a reliable guide to model performance and therefore the remaining tables and graphs are not included in this report.

TABLE 3. 95% CONFIDENCE INTERVALS BASED ON TWO-WAY ANOVA

CRITERION S
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}$	.0539	.0539	.0539	.0539	.0539	.0539	-1.0000	.0539	.0539	.0539	.0539
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.240	.296	.411	.240	.248	.284	-1.000	.236	.326	.232	.365
$\bar{V}$	.284	.340	.455	.284	.292	.328	-1.000	.280	.370	.276	.409
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	.328	.384	.499	.328	.336	.372	-1.000	.324	.414	.320	.453

VERIFICATION PERIOD

$\hat{\sigma}$	.0927	.0927	.0927	.0927	.0927	.0927	.0927	.0927	.0927	.0927	.0927
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.257	.256	.492	.246	.201	.193	.240	.208	.367	.171	.567
$\bar{V}$	.352	.351	.587	.341	.296	.288	.335	.303	.462	.266	.662
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	.447	.446	.682	.436	.391	.383	.430	.398	.557	.361	.757

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}$	.0598	.0598	.0598	.0598	.0598	.0598	-1.0000	.0598	.0598	.0598	.0598
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.190	.234	.294	.157	.201	.258	-1.000	.202	.276	.186	.336
$\bar{V}$	.239	.283	.343	.206	.250	.307	-1.000	.251	.325	.235	.385
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	.288	.332	.392	.255	.299	.356	-1.000	.300	.374	.284	.434

VERIFICATION PERIOD

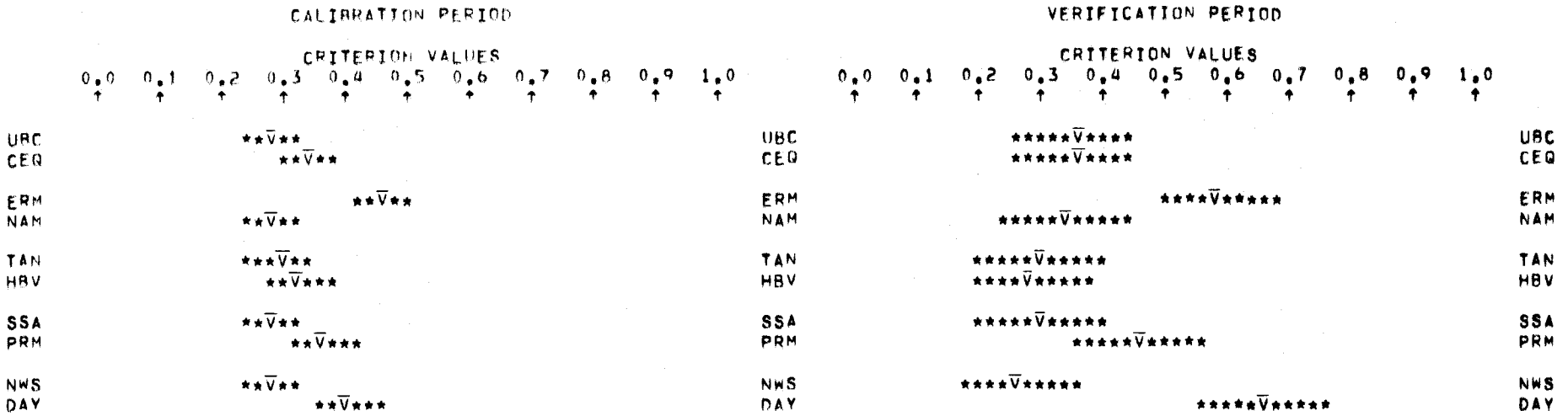
$\hat{\sigma}$	.1138	.1138	.1138	.1138	.1138	.1138	.1138	.1138	.1138	.1138	.1138
$\bar{V} - t_{(.975,d)}\hat{\sigma}$	.211	.146	.459	.070	.145	.103	.114	.152	.265	.086	.496
$\bar{V}$	.327	.262	.575	.186	.261	.219	.230	.268	.381	.202	.612
$\bar{V} + t_{(.975,d)}\hat{\sigma}$	.443	.378	.691	.302	.377	.335	.346	.384	.497	.318	.728

$\hat{\sigma} = \sqrt{\text{residual mean square}}$
d = degrees of freedom
$\bar{V}$ = is the arithmetic mean of the annual values

FIGURE 3. 95% CONFIDENCE INTERVALS BASED ON TWO-WAY ANOVA

CRITERION S
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



SNOWMELT SEASON

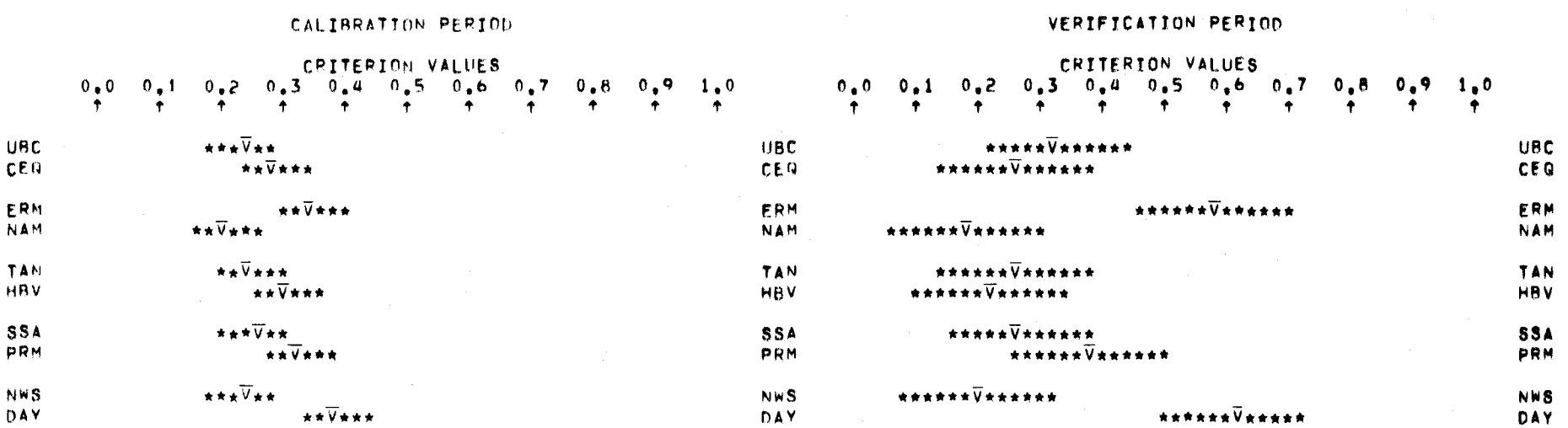


FIGURE 4. MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY TWO-WAY ANOVA

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	PRM	CEQ	HBV	TAN	NAM	UBC	NWS	SSA
SSA						*	*	*	*	0
NWS						*	*	*	0	
UBC					*	*	*	0		
NAM					*	*	0			
TAN					*	0				
HBV			*	*	0					
CEQ			*	0						
PRM		*	0							
DAY		0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	UBC	CEQ	NAM	TAN	SRM	SSA	HBV	NWS
NWS			*	*	*	*	*	*	*	*	0
HBV			*	*	*	*	*	*	*	0	
SSA			*	*	*	*	*	*	0		
SRM			*	*	*	*	*	0			
TAN			*	*	*	*	0				
NAM			*	*	*	0					
CEQ			*	*	0						
UBC			*	0							
PRM			0								
ERM	*	0									
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	PRM	HBV	CEQ	TAN	SSA	NWS	UBC	NAM
NAM										0
UBC					*	*	*	*	0	
NWS					*	*	*	0		
SSA					*	*	0			
TAN					*	0				
CEQ			*	*	0					
HBV		*	*	0						
PRM		*	0							
ERM		0								
DAY	0									

VERIFICATION PERIOD

	ERM	DAY	PRM	UBC	CEQ	TAN	SSA	NWS	SRM	HBV	NAM
NAM			*	*	*	*	*	*	*	*	0
HBV			*	*	*	*	*	*	*	0	
SRM			*	*	*	*	*	*	0		
NWS			*	*	*	*	*	0			
SSA			*	*	*	*	0				
TAN			*	*	*	0					
CEQ			*	*	0						
UBC			*	0							
PRM			0								
DAY	*	0									
ERM	0										

FIGURE 5. MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY TWO-WAY ANOVA

CRITERION S
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	PRM	CEQ	HBV	TAN	NAM	UBC	SSA	NWS
NWS						*	*	*	*	0
SSA						*	*	*	0	
UBC					*	*	*	0		
NAM					*	*	0			
TAN					*	0				
HBV			*	*	0					
CEQ			*	0						
PRM		*	0							
DAY		0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	UBC	CEQ	NAM	SRM	SSA	TAN	HBV	NWS
NWS				*	*	*	*	*	*	*	0
HBV				*	*	*	*	*	*	0	
TAN				*	*	*	*	*	0		
SSA				*	*	*	*	0			
SRM				*	*	*	0				
NAM				*	*	0					
CEQ				*	0						
UBC				0							
PRM			0								
ERM		*	0								
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	PRM	HBV	CEQ	SSA	TAN	UBC	NWS	NAM
NAM						*	*	*	*	0
NWS					*	*	*	*	0	
UBC					*	*	*	0		
TAN					*	*	0			
SSA					*	0				
CEQ			*	*	0					
HBV		*	*	0						
PRM		*	0							
ERM	*	0								
DAY	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	UBC	SSA	CEQ	TAN	SRM	HBV	NWS	NAM
NAM					*	*	*	*	*	*	0
NWS					*	*	*	*	*	0	
HBV				*	*	*	*	*	0		
SRM				*	*	*	*	0			
TAN				*	*	*	0				
CEQ				*	*	0					
SSA			*	*	0						
UBC			*	0							
PRM			0								
ERM		*	0								
DAY	0										

2.2 Jackknife statistic

The Jackknife statistic is a refinement of methods of direct assessment of sample variability (Mosteller and Tukey, 1977). This technique is based on the subdivision of the sample in a number of subsamples and the computation of the statistic by omitting each subsample in turn. The statistic thus obtained has a t-distribution and therefore can be used to compute confidence intervals for the values of the verification criteria.

In this connection, it must be noted that the Jackknife statistic is generally valid for independently and identically distributed observations. The use of this statistic in the present context is justified by the lack of autocorrelation of annual flows since the groups used in the computation of the statistic consist of the daily flow for individual years.

The procedure for computing the Jackknifed estimates and the corresponding confidence intervals for the values of the verification criteria consists of the following steps:

1) Given the observations:

$$Z_i = (y_{oi} - y_{ci}),\ i = 1, 2, \ldots, n$$

compute the value of the verification criterion $V_{all} = f(z_1, \ldots, z_n)$ for all the data.

2) Subdivide the data into ℓ groups where ℓ is the number of years in the calibration or verification period.

3) Let $V_{(j)}$ be the value of the criterion computed from the portion of the sample that omits the j-th group. Compute the "pseudovalues"

$$V_{*j} = \ell V_{all} - (\ell-1) V_{(j)}$$

$$j : 1, 2, \ldots, \ell$$

4) The "Jackknifed" value of V is

$$V_* = \frac{1}{\ell} (V_{*1} + \ldots + V_{*\ell})$$

and

$$\text{Var } (V_*) = \frac{1}{\ell} \text{Var } (V_{*j})$$

$$= \frac{1}{\ell} \left[\frac{\Sigma(V_{*j} - V_*)^2}{\ell-1}\right]$$

$$= \frac{1}{\ell} \left[\frac{\Sigma V_{*j}^2 - \frac{1}{\ell} (\Sigma V_{*j})^2}{(\ell-1)}\right]$$

5) To form confidence intervals for V_*, use the t-distribution with (ℓ-1) degrees of freedom.

Table 4 shows the results for the criterion NTD for the Durance River including the 95% confidence intervals. The tables for all the criteria are shown in Appendix C.

Figure 6 shows in graphical form the confidence intervals of Table 4. The graphs for all the criteria are shown in Appendix D.

It must be noted that the symbol V in the graphs represents the jackknifed value V_*.

Figure 7 shows the model groups based on confidence intervals of the criterion NTD calculated with the Jackknife statistic. The model groups for all the criteria are shown in Appendix E.

3. CONCLUSIONS

A. METHODOLOGY

The following methods were used for computing confidence intervals:

1- The method of ordinary ANOVA which is based on the pooled standard deviation and therefore cannot take into account the difference in variances between models.

TABLE 4. 95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	FRM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0108	.0497	.0347	.0202	.0225	.0405	-1.0000	.0068	.0428	.0196	.0249
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.874	.718	.659	.847	.832	.753	-1.000	.882	.717	.858	.726
V_*	.901	.846	.748	.899	.890	.857	-1.000	.900	.827	.908	.790
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.929	.974	.837	.951	.947	.961	-1.000	.917	.937	.959	.854

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0370	.0181	.0550	.0181	.0344	.0316	.0250	.0289	.0627	.0075	.0671
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.754	.833	.514	.808	.782	.797	.788	.795	.558	.910	.355
V_*	.872	.891	.689	.865	.892	.897	.868	.887	.757	.934	.568
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.989	.948	.864	.923	1.001	.998	.947	.979	.957	.958	.781

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0212	.1042	.0656	.0346	.0321	.0921	-1.0000	.0229	.0880	.0358	.0568
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.798	.485	.528	.796	.746	.484	-1.000	.765	.481	.763	.451
V_*	.853	.753	.696	.885	.829	.721	-1.000	.824	.707	.855	.597
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.908	1.021	.865	.974	.911	.957	-1.000	.883	.933	.947	.743

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0345	.0174	.0818	.0218	.0646	.0277	.0552	.0685	.0372	.0160	.0911
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.734	.852	.267	.863	.651	.808	.714	.608	.645	.885	.117
V_*	.844	.907	.527	.932	.857	.896	.890	.826	.763	.936	.406
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.954	.962	.787	1.002	1.062	.984	1.065	1.044	.882	.987	.696

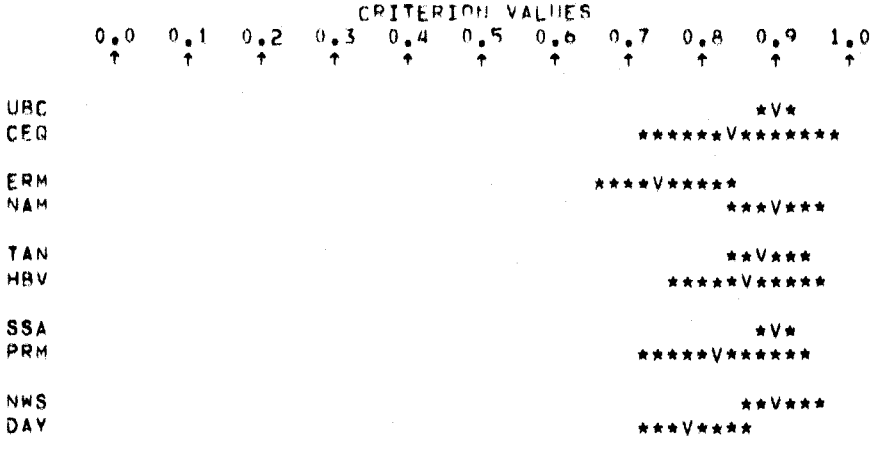
$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

FIGURE 6. 95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

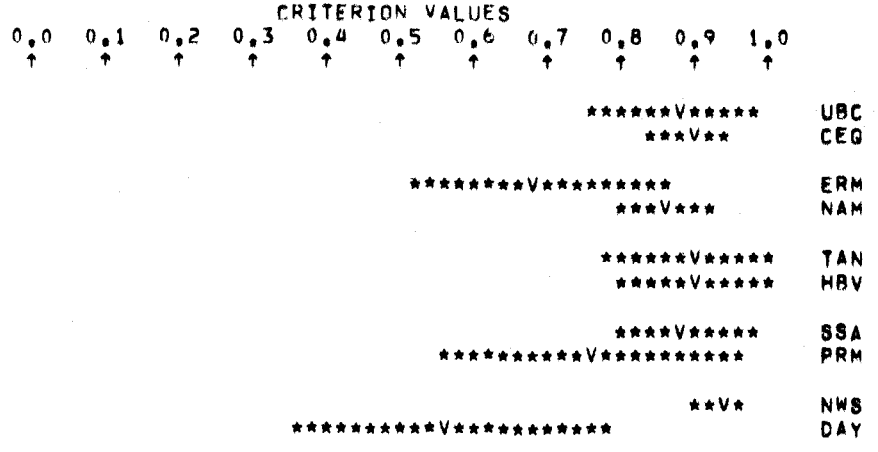
CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

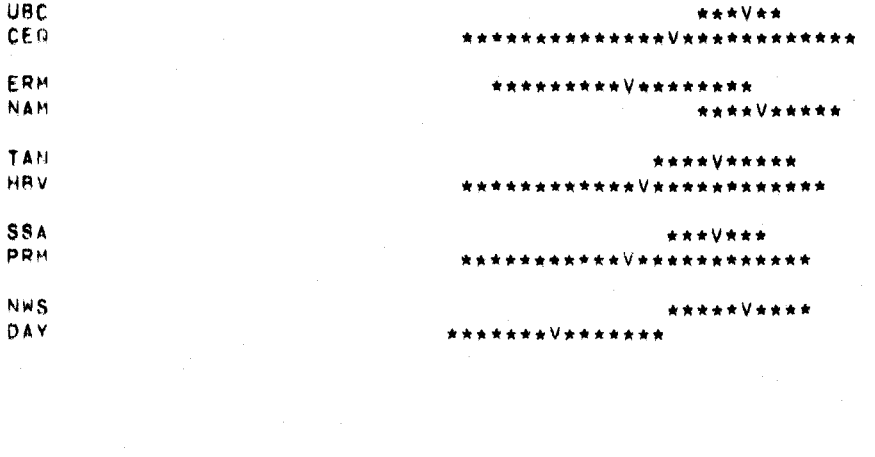


VERIFICATION PERIOD



SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD

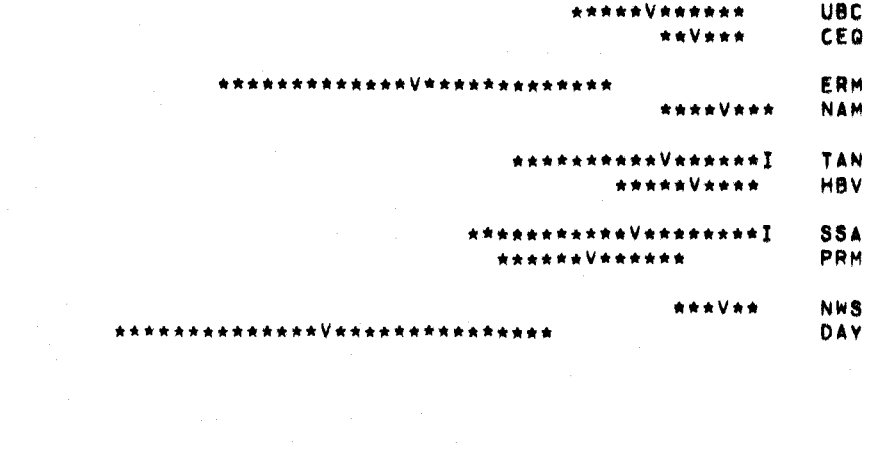


FIGURE 7. MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	PRM	CEQ	HBV	TAN	NAM	SSA	UBC	NWS
NWS						*	*	*	*	0
UBC						*	*	*	0	
SSA						*	*	0		
NAM					*	*	0			
TAN				*	*	0				
HBV		*	*	*	0					
CEQ	*	*	*	0						
PRM	*	*	0							
DAY	*	0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	NAM	SRM	UBC	SSA	CEQ	TAN	HBV	NWS
NWS											0
HBV				*	*	*	*	*	*	0	
TAN				*	*	*	*	*	0		
CEQ				*	*	*	*	0			
SSA				*	*	*	0				
UBC			*	*	*	0					
SRM				*	0						
NAM				0							
PRM	*	*	0								
ERM	*	0									
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	PRM	HBV	CEQ	SSA	TAN	UBC	NWS	NAM
NAM						*	*	*	*	0
NWS						*	*	*	0	
UBC						*	*	0		
TAN					*	*	0			
SSA						0				
CEQ	*	*	*	*	0					
HBV	*	*	*	0						
PRM	*	*	0							
ERM	*	0								
DAY	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	SSA	UBC	TAN	SRM	HBV	CEQ	NAM	NWS
NWS							*	*	*	*	0
NAM							*	*	*	0	
CEQ						*	*	*	0		
HBV				*	*	*	*	0			
SRM			*	*	*	*	0				
TAN			*	*	*	0					
UBC			*	*	0						
SSA			*	0							
PRM			0								
ERM	*	0									
DAY	0										

2- Friedman's non-parametric two-way ANOVA based on ranks, which is not sufficiently sensitive in discriminating between models.

3- The Jackknife statistic which can take into account the different variabilities of the models but cannot provide non-symmetric confidence intervals which are more realistic in some cases. In addition, the Jackknife is valid only for identically and independently distributed random variables. Consequently, it was necessary to subdivide the data into complete years, which reduced the number of groups used in the computation of the Jackknife statistic. Despite this limitation, it was decided that the Jackknife statistic is to be preferred to the two other methods.

B. RESULTS

1- An examination of the tables and graphs of the verification criteria indicates that there is an overlap between criterion values and consequently it is desirable to estimate confidence intervals.

2- The confidence intervals of the criterion values based on the jackknife statistic indicate that the models can be classified into groups within which the performances are not significantly different. In this case, model performance must be evaluated on the basis of factors other than the numerical verification criteria.

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APPENDIX A

ANNUAL CRITERION VALUES

R

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HRV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	-.078	-.103	.011	.032	-.124	-.078	-1.000	.007	-.088	-.073	-.125
CAL	70-71	-.050	.081	.100	.130	.003	.037	-1.000	.105	.077	.045	-.139
CAL	71-72	.056	.002	.173	.117	-.045	-.073	-1.000	-.019	-.009	-.060	.135
CAL	72-73	-.056	.080	-.056	.049	.107	.123	-1.000	.024	.045	-.035	-.014
CAL	73-74	.141	.001	-.070	-.024	-.077	-.036	-1.000	-.116	-.005	-.062	.077
CAL	74-75	.057	.002	.187	.030	.004	.029	.020	-.065	-.027	-.075	.147
VER	75-76	.079	.069	.187	-.016	.019	.007	-.045	-.055	-.032	-.022	.431
VER	76-77	-.033	.042	-.268	.104	-.030	.123	.060	.013	.013	.022	-.413
VER	77-78	.108	.075	-.304	.199	-.088	-.020	-.066	-.021	.104	-.002	-.370
VER	78-79	-.009	.089	.039	.337	.004	-.032	.037	.114	.236	.144	-.078

SNOWMELT SEASON

CAL	69-70	-.117	-.110	-.084	.006	-.127	-.057	-1.000	.012	-.070	-.094	-.164
CAL	70-71	-.094	.055	.010	.039	-.036	.061	-1.000	.115	.139	.070	-.164
CAL	71-72	.084	.013	.270	.087	-.022	-.064	-1.000	-.014	.085	-.015	.150
CAL	72-73	-.033	.042	.158	-.001	.110	.232	-1.000	.104	.242	-.060	.004
CAL	73-74	.081	-.115	.243	-.107	-.155	-.134	-1.000	-.144	.015	-.149	.078
CAL	74-75	.134	.053	.287	-.002	.026	-.025	.031	-.025	.173	-.053	.229
VER	75-76	.087	.017	.657	-.096	-.072	.017	.042	.008	.150	-.000	.708
VER	76-77	-.040	-.065	-.291	-.043	-.143	.039	.036	-.053	-.094	.017	-.400
VER	77-78	-.034	-.137	-.386	-.019	-.137	-.022	-.052	-.042	-.162	-.076	-.314
VER	78-79	-.037	-.057	-.206	.112	-.042	-.095	.203	.065	.168	.006	-.194

ANNUAL CRITERION VALUES

NTD

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.929	.921	.812	.954	.896	.937	-1.000	.904	.920	.957	.844
CAL	70-71	.896	.910	.815	.894	.935	.860	-1.000	.881	.836	.910	.793
CAL	71-72	.881	.925	.750	.901	.928	.891	-1.000	.906	.853	.909	.798
CAL	72-73	.912	.641	.692	.837	.804	.686	-1.000	.921	.685	.921	.700
CAL	73-74	.875	.784	.637	.883	.919	.856	-1.000	.876	.880	.863	.804
CAL	74-75	.862	.834	.642	.877	.823	.875	.934	.893	.684	.808	.732
VER	75-76	.357	.316	-.780	.784	.688	.845	.837	.838	.323	.742	-1.009
VER	76-77	.873	.884	.700	.860	.884	.816	.805	.897	.756	.939	.462
VER	77-78	.804	.867	.595	.820	.825	.922	.893	.822	.624	.920	.485
VER	78-79	.961	.935	.797	.875	.972	.922	.845	.916	.880	.929	.774

SNOWMELT SEASON

CAL	69-70	.877	.924	.833	.977	.862	.914	-1.000	.833	.897	.928	.697
CAL	70-71	.852	.837	.807	.836	.847	.578	-1.000	.696	.567	.780	.438
CAL	71-72	.737	.889	.561	.873	.888	.750	-1.000	.780	.729	.880	.522
CAL	72-73	.884	.398	.621	.827	.746	.447	-1.000	.880	.477	.890	.469
CAL	73-74	.850	.691	.584	.833	.862	.719	-1.000	.793	.796	.758	.695
CAL	74-75	.709	.696	.363	.826	.586	.762	.907	.821	.437	.660	.391
VER	75-76	-.898	-.371	-4.817	.727	.321	.821	.814	.732	-.728	.379	-3.612
VER	76-77	.684	.881	.282	.936	.832	.759	.874	.822	.622	.924	-.159
VER	77-78	.826	.881	.399	.889	.734	.901	.925	.693	.690	.904	.328
VER	78-79	.939	.952	.764	.943	.963	.883	.726	.872	.835	.967	.581

ANNUAL CRITERION VALUES

S

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	FRM	NWS	DAY
CAL	69-70	.245	.259	.401	.199	.298	.232	-1.000	.285	.261	.192	.364
CAL	70-71	.271	.252	.361	.273	.215	.315	-1.000	.290	.341	.253	.382
CAL	71-72	.303	.241	.440	.278	.236	.290	-1.000	.270	.338	.266	.396
CAL	72-73	.266	.537	.497	.362	.398	.503	-1.000	.252	.503	.252	.491
CAL	73-74	.310	.408	.529	.300	.250	.333	-1.000	.309	.305	.325	.389
CAL	74-75	.313	.343	.503	.295	.354	.298	.216	.275	.473	.368	.435
VER	75-76	.502	.518	.835	.291	.350	.246	.253	.252	.515	.318	.887
VER	76-77	.287	.275	.441	.301	.275	.346	.356	.259	.398	.199	.591
VER	77-78	.398	.327	.572	.382	.376	.251	.294	.380	.551	.255	.645
VER	78-79	.220	.282	.499	.393	.184	.310	.437	.322	.384	.296	.527

SNOWMELT SEASON

CAL	69-70	.208	.164	.243	.090	.221	.174	-1.000	.243	.191	.159	.327
CAL	70-71	.177	.185	.202	.186	.179	.298	-1.000	.253	.302	.215	.344
CAL	71-72	.294	.191	.380	.204	.192	.287	-1.000	.269	.299	.199	.396
CAL	72-73	.227	.517	.410	.277	.336	.495	-1.000	.231	.482	.221	.486
CAL	73-74	.247	.355	.412	.261	.237	.339	-1.000	.291	.288	.314	.353
CAL	74-75	.278	.284	.411	.215	.332	.251	.157	.218	.387	.300	.402
VER	75-76	.566	.481	.991	.214	.338	.174	.177	.213	.540	.324	.882
VER	76-77	.261	.160	.393	.117	.190	.227	.165	.195	.285	.128	.499
VER	77-78	.304	.252	.566	.243	.376	.229	.200	.404	.406	.226	.598
VER	78-79	.178	.158	.352	.173	.140	.248	.379	.259	.295	.131	.469

ANNUAL CRITERION VALUES

NS

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.546	.493	-.212	.702	.330	.594	-1.000	.385	.487	.722	0.000
CAL	70-71	.497	.567	.106	.489	.684	.321	-1.000	.423	.205	.563	0.000
CAL	71-72	.413	.629	-.236	.508	.646	.463	-1.000	.533	.273	.549	0.000
CAL	72-73	.707	-.196	-.026	.456	.345	-.047	-1.000	.737	-.049	.737	0.000
CAL	73-74	.366	-.099	-.846	.406	.586	.266	-1.000	.368	.387	.303	0.000
CAL	74-75	.484	.380	-.336	.540	.340	.531	.753	.601	-.181	.284	0.000
VER	75-76	.680	.659	.114	.893	.845	.923	.919	.919	.663	.872	0.000
VER	76-77	.764	.784	.442	.741	.784	.658	.637	.808	.546	.887	0.000
VER	77-78	.618	.742	.214	.649	.659	.849	.792	.654	.269	.844	0.000
VER	78-79	.826	.714	.104	.445	.878	.655	.315	.627	.471	.686	0.000

SNOWMELT SEASON

CAL	69-70	.595	.751	.450	.924	.543	.717	-1.000	.450	.661	.763	0.000
CAL	70-71	.736	.711	.656	.709	.728	.249	-1.000	.459	.229	.609	0.000
CAL	71-72	.449	.767	.080	.735	.765	.476	-1.000	.539	.432	.748	0.000
CAL	72-73	.782	-.134	.286	.675	.521	-.041	-1.000	.774	.014	.793	0.000
CAL	73-74	.509	-.014	-.364	.453	.549	.080	-1.000	.320	.333	.208	0.000
CAL	74-75	.521	.501	-.046	.714	.320	.610	.847	.707	.075	.442	0.000
VER	75-76	.589	.703	-.261	.941	.853	.961	.960	.942	.625	.865	0.000
VER	76-77	.727	.897	.380	.945	.855	.792	.891	.847	.674	.934	0.000
VER	77-78	.741	.823	.106	.835	.605	.853	.888	.544	.539	.857	0.000
VER	78-79	.855	.886	.438	.864	.911	.720	.346	.694	.605	.921	0.000

ANNUAL CRITERION VALUES

R

CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	68-69	-.039	-.046	-1.000	.060	.008	.009	-.124	-.003	-.122	-.033	-.049
CAL	69-70	.028	.009	-1.000	.108	.005	.083	-.192	-.009	-.033	-.001	.231
CAL	70-71	.093	.067	-1.000	.247	.061	.130	-.050	-.004	.055	-.019	.296
CAL	71-72	-.030	-.077	-1.000	.074	-.057	.067	-.081	-.045	-.101	-.031	.116
CAL	72-73	.012	.037	-1.000	.147	.031	.052	-.024	-.001	.010	.035	-.153
CAL	73-74	-.002	.003	-1.000	.115	-.005	.005	-.101	.048	-.025	.019	-.224
VER	74-75	.172	.161	-1.000	.166	.073	.208	-.116	.081	.043	.060	.366
VER	75-76	-.041	-.037	-1.000	.039	-.023	-.000	-.092	-.065	-.024	-.016	-.127
VER	76-77	.034	.040	-1.000	.056	-.053	.140	-.226	-.044	-.019	.009	.017
VER	77-78	.011	-.008	-1.000	.050	-.092	.038	-.279	.031	-.069	.030	-.094

SNOWMELT SEASON

CAL	68-69	-.139	-.046	-1.000	-.059	.018	.003	-.090	.007	-.083	.007	-.170
CAL	69-70	-.066	-.065	-1.000	-.133	-.073	-.086	-.067	-.075	-.178	-.113	.284
CAL	70-71	-.004	-.013	-1.000	-.044	.040	-.015	.057	-.066	-.112	-.049	.093
CAL	71-72	-.041	.004	-1.000	-.145	-.040	-.015	-.072	-.044	-.086	-.032	.042
CAL	72-73	-.009	.093	-1.000	.073	.055	.098	.038	.038	-.048	.118	.041
CAL	73-74	-.015	.091	-1.000	-.083	-.015	-.057	-.077	-.001	-.079	.010	-.153
VER	74-75	.075	.016	-1.000	-.070	.078	.046	-.087	.104	.004	.061	.438
VER	75-76	-.159	-.064	-1.000	-.242	-.133	-.167	.007	-.092	-.115	-.098	-.124
VER	76-77	.040	.049	-1.000	-.049	.044	.025	-.175	.021	-.039	.049	.158
VER	77-78	.106	.154	-1.000	-.041	-.025	.066	-.146	.159	-.007	.084	.143

ANNUAL CRITERION VALUES

NTD

CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	68-69	.874	.760	-1.000	.774	.939	.820	.873	.784	.841	.914	.697
CAL	69-70	.870	.809	-1.000	.825	.945	.877	.808	.930	.816	.914	.595
CAL	70-71	.864	.733	-1.000	.848	.952	.891	.868	.905	.810	.967	.657
CAL	71-72	.938	.896	-1.000	.908	.932	.931	.861	.934	.836	.967	.593
CAL	72-73	.861	.563	-1.000	.774	.932	.811	.709	.863	.891	.927	.205
CAL	73-74	.840	.633	-1.000	.816	.822	.879	.739	.828	.788	.904	.548
VER	74-75	.766	.702	-1.000	.695	.786	.711	.720	.761	.794	.884	.364
VER	75-76	.802	.774	-1.000	.734	.723	.825	.795	.832	.796	.886	.077
VER	76-77	.754	.662	-1.000	.777	.861	.724	.675	.804	.772	.914	-.205
VER	77-78	.714	.335	-1.000	.841	.877	.653	.609	.665	.806	.913	.336

SNOWMELT SEASON

CAL	68-69	.879	.668	-1.000	.719	.947	.777	.858	.723	.814	.893	.628
CAL	69-70	.909	.853	-1.000	.897	.948	.934	.847	.928	.825	.919	.581
CAL	70-71	.899	.836	-1.000	.927	.934	.908	.916	.877	.846	.958	.698
CAL	71-72	.941	.884	-1.000	.917	.916	.934	.850	.940	.798	.964	.532
CAL	72-73	.610	.524	-1.000	.712	.735	.304	.697	.449	.674	.677	-.806
CAL	73-74	.867	.659	-1.000	.798	.631	.846	.702	.837	.663	.841	.565
VER	74-75	.914	.748	-1.000	.839	.677	.865	.714	.633	.928	.840	.408
VER	75-76	.733	.711	-1.000	.658	.528	.809	.849	.761	.764	.835	-.368
VER	76-77	.714	.749	-1.000	.837	.824	.741	.702	.686	.773	.869	-.596
VER	77-78	.780	.041	-1.000	.857	.896	.689	.852	.604	.844	.914	.589

ANNUAL CRITERION VALUES

S

CATCHMENT W3 - WATERSHED (USA)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	68-69	.518	.715	-1.000	.694	.360	.619	.520	.679	.581	.427	.803
CAL	69-70	.458	.556	-1.000	.530	.297	.445	.557	.336	.544	.372	.808
CAL	70-71	.606	.848	-1.000	.641	.361	.542	.598	.507	.716	.300	.961
CAL	71-72	.391	.506	-1.000	.476	.408	.411	.586	.404	.635	.286	1.001
CAL	72-73	.457	.810	-1.000	.583	.319	.533	.661	.453	.404	.331	1.093
CAL	73-74	.429	.649	-1.000	.459	.452	.372	.548	.444	.494	.331	.720
VER	74-75	.568	.640	-1.000	.648	.543	.631	.621	.574	.533	.400	.936
VER	75-76	.493	.526	-1.000	.571	.583	.463	.502	.454	.500	.375	1.064
VER	76-77	.536	.628	-1.000	.510	.403	.567	.616	.478	.516	.318	1.186
VER	77-78	.582	.887	-1.000	.434	.381	.640	.680	.629	.479	.320	.886

SNOWMELT SEASON

CAL	68-69	.329	.545	-1.000	.501	.218	.446	.356	.498	.408	.309	.577
CAL	69-70	.305	.386	-1.000	.323	.229	.258	.394	.270	.422	.286	.652
CAL	70-71	.321	.410	-1.000	.272	.260	.307	.293	.355	.397	.207	.556
CAL	71-72	.286	.401	-1.000	.339	.342	.304	.455	.288	.529	.223	.806
CAL	72-73	.340	.376	-1.000	.293	.281	.455	.300	.405	.311	.310	.733
CAL	73-74	.266	.427	-1.000	.329	.444	.288	.400	.295	.425	.292	.482
VER	74-75	.263	.450	-1.000	.359	.509	.329	.479	.543	.240	.358	.689
VER	75-76	.397	.413	-1.000	.449	.527	.335	.298	.375	.372	.312	.897
VER	76-77	.432	.405	-1.000	.327	.339	.412	.441	.453	.385	.293	1.021
VER	77-78	.440	.919	-1.000	.355	.302	.523	.361	.590	.370	.275	.601

ANNUAL CRITERION VALUES

NS

CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	68-69	.585	.206	-1.000	.253	.798	.406	.580	.285	.477	.718	0.000
CAL	69-70	.679	.527	-1.000	.569	.865	.697	.525	.827	.546	.788	0.000
CAL	70-71	.603	.221	-1.000	.555	.859	.682	.613	.722	.445	.903	0.000
CAL	71-72	.847	.744	-1.000	.774	.834	.831	.658	.837	.597	.919	0.000
CAL	72-73	.825	.450	-1.000	.715	.915	.762	.634	.828	.863	.908	0.000
CAL	73-74	.645	.188	-1.000	.593	.606	.733	.422	.619	.530	.788	0.000
VER	74-75	.631	.532	-1.000	.521	.663	.546	.560	.624	.676	.817	0.000
VER	75-76	.786	.755	-1.000	.712	.700	.811	.778	.818	.779	.876	0.000
VER	76-77	.796	.720	-1.000	.815	.884	.771	.730	.838	.811	.928	0.000
VER	77-78	.569	-.002	-1.000	.760	.815	.478	.411	.496	.707	.869	0.000

SNOWMELT SEASON

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	68-69	.675	.106	-1.000	.245	.857	.400	.618	.254	.499	.713	0.000
CAL	69-70	.782	.649	-1.000	.754	.877	.843	.635	.829	.582	.807	0.000
CAL	70-71	.666	.456	-1.000	.760	.781	.695	.722	.591	.490	.861	0.000
CAL	71-72	.874	.752	-1.000	.822	.820	.858	.680	.872	.568	.924	0.000
CAL	72-73	.784	.737	-1.000	.841	.853	.614	.832	.695	.819	.821	0.000
CAL	73-74	.695	.215	-1.000	.536	.151	.645	.314	.625	.224	.634	0.000
VER	74-75	.854	.573	-1.000	.728	.453	.773	.517	.379	.879	.730	0.000
VER	75-76	.805	.788	-1.000	.750	.655	.860	.889	.825	.828	.879	0.000
VER	76-77	.821	.843	-1.000	.898	.890	.838	.813	.803	.858	.918	0.000
VER	77-78	.465	-1.337	-1.000	.651	.747	.242	.640	.036	.620	.791	0.000

ANNUAL CRITERION VALUES

R

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	70-71	.199	.024	.047	.088	-.020	-.028	-1.000	-.031	-.069	-.084	.264
CAL	71-72	.067	.084	.106	.014	.186	.119	-1.000	.076	.097	.137	.075
CAL	72-73	-.116	-.067	-.156	-.053	-.023	-.044	-1.000	-.022	-.038	-.028	-.044
CAL	73-74	-.043	.028	.017	.011	.043	.063	-1.000	.016	.012	.004	.042
CAL	74-75	-.125	-.006	-.127	-.122	-.046	-.008	-1.000	-.021	-.062	.005	-.234
CAL	75-76	-.026	.061	-.031	.315	.061	.036	.008	.007	.045	-.019	.033
VER	76-77	-.079	-.058	.043	.220	.036	-.041	-1.000	.061	.009	-.044	.035
VER	77-78	-.193	-.127	-.108	.148	-.032	-.086	-1.000	-.084	-.101	-.128	-.035
VER	78-79	-.091	.015	.042	.294	.086	.053	-1.000	-.067	.004	-.008	.242
VER	79-80	.021	.087	-.048	.055	.084	.167	-1.000	.160	.094	.143	-.071

SNOWMELT SEASON

CAL	70-71	.141	-.118	-.220	.113	-.104	-.056	-1.000	-.194	-.211	-.101	.074
CAL	71-72	.146	.244	.331	.022	.459	.093	-1.000	.019	.221	.244	.386
CAL	72-73	-.197	-.247	-.251	-.039	-.040	-.063	-1.000	-.254	-.210	-.099	-.144
CAL	73-74	.073	.075	.286	.162	.304	.210	-1.000	.062	.043	.281	.306
CAL	74-75	-.153	.040	-.044	-.230	-.007	-.128	-1.000	-.125	-.075	.019	-.068
CAL	75-76	-.028	-.055	-.148	.510	.152	.064	.051	-.147	-.094	.008	-.254
VER	76-77	-.036	-.113	.025	.119	.074	-.080	-1.000	-.158	-.153	.045	-.293
VER	77-78	-.155	-.210	-.129	.264	.021	-.067	-1.000	-.174	-.174	.016	-.276
VER	78-79	-.018	-.027	-.002	.379	.133	.086	-1.000	-.122	-.052	.102	.034
VER	79-80	-.013	-.041	.007	-.163	.109	.115	-1.000	-.128	-.062	.158	.294

ANNUAL CRITERION VALUES

NTD

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

		URC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	70-71	.568	.605	.263	.665	.642	.281	-1.000	.519	.576	.759	-.471
CAL	71-72	.825	.877	.818	.718	.855	.882	-1.000	.729	.907	.931	.241
CAL	72-73	.891	.557	.726	.691	.923	.875	-1.000	.352	.926	.908	.349
CAL	73-74	.633	.705	.801	.726	.861	.824	-1.000	.695	.805	.843	.226
CAL	74-75	.622	.463	.290	.532	.603	.597	-1.000	.461	.718	.620	.196
CAL	75-76	.445	.629	.748	-.112	.748	.736	.750	.631	.588	.898	.114
VER	76-77	.147	.170	-1.405	.415	.389	.557	-1.000	.244	.392	.560	-.594
VER	77-78	.598	.777	.572	.715	.807	.722	-1.000	.638	.778	.777	.190
VER	78-79	.504	.702	.297	.209	.685	.743	-1.000	.693	.725	.714	-.602
VER	79-80	.861	.788	.699	.719	.853	.764	-1.000	.536	.869	.873	.106

SNOWMELT SEASON

CAL	70-71	.829	.664	.126	.651	.435	.212	-1.000	.326	.540	.654	.151
CAL	71-72	.304	.502	.490	.701	.229	.710	-1.000	.758	.582	.691	-.130
CAL	72-73	.697	.737	.296	.797	.693	.839	-1.000	.591	.542	.752	.498
CAL	73-74	.194	.273	-.259	.155	.260	.568	-1.000	.639	.632	.316	-.533
CAL	74-75	.180	.358	.082	.289	-.223	.621	-1.000	.704	.386	.337	.465
CAL	75-76	.594	.597	.719	-.750	.747	.638	.759	.555	.643	.930	.376
VER	76-77	.665	.152	-4.831	.084	.668	.445	-1.000	.436	.537	.433	-.785
VER	77-78	.539	.660	.343	.526	.749	.747	-1.000	.579	.725	.834	.033
VER	78-79	.579	.689	-.029	-.237	.735	.699	-1.000	.607	.675	.676	.086
VER	79-80	.666	.722	.493	.579	.816	.599	-1.000	.608	.709	.696	.265

ANNUAL CRITERION VALUES

S

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	70-71	.546	.522	.714	.481	.497	.705	-1.000	.577	.541	.408	1.008
CAL	71-72	.783	.656	.797	.993	.713	.644	-1.000	.974	.570	.491	1.629
CAL	72-73	.545	1.099	.865	.918	.458	.583	-1.000	1.329	.448	.501	1.332
CAL	73-74	.736	.659	.542	.636	.453	.509	-1.000	.671	.537	.481	1.068
CAL	74-75	.435	.519	.597	.485	.447	.450	-1.000	.520	.377	.437	.635
CAL	75-76	.756	.619	.509	1.071	.510	.522	.508	.617	.651	.325	.956
VER	76-77	.647	.638	1.086	.536	.547	.466	-1.000	.609	.546	.465	.884
VER	77-78	.694	.516	.716	.584	.480	.576	-1.000	.658	.516	.517	.985
VER	78-79	.495	.383	.589	.625	.394	.356	-1.000	.389	.369	.376	.889
VER	79-80	.597	.737	.879	.848	.613	.779	-1.000	1.091	.579	.570	1.514

SNOWMELT SEASON

CAL	70-71	.339	.475	.765	.484	.615	.726	-1.000	.672	.555	.481	.754
CAL	71-72	.660	.558	.565	.433	.695	.426	-1.000	.389	.511	.440	.841
CAL	72-73	.426	.397	.649	.349	.429	.311	-1.000	.495	.524	.385	.548
CAL	73-74	.527	.500	.658	.539	.504	.385	-1.000	.352	.356	.485	.726
CAL	74-75	.560	.495	.593	.521	.684	.381	-1.000	.336	.485	.503	.452
CAL	75-76	.630	.627	.523	1.306	.497	.594	.485	.659	.590	.262	.780
VER	76-77	.292	.465	1.219	.483	.291	.376	-1.000	.379	.344	.380	.674
VER	77-78	.562	.482	.671	.570	.415	.417	-1.000	.537	.435	.337	.814
VER	78-79	.481	.413	.752	.824	.381	.407	-1.000	.465	.423	.422	.709
VER	79-80	.426	.388	.525	.478	.316	.467	-1.000	.461	.398	.406	.631

ANNUAL CRITERION VALUES

NS

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

		URC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	70-71	.706	.732	.499	.772	.757	.512	-1.000	.673	.712	.836	0.000
CAL	71-72	.769	.838	.761	.628	.809	.844	-1.000	.643	.878	.909	0.000
CAL	72-73	.833	.320	.579	.525	.882	.809	-1.000	.005	.887	.859	0.000
CAL	73-74	.525	.619	.743	.646	.820	.773	-1.000	.606	.747	.797	0.000
CAL	74-75	.530	.332	.117	.418	.506	.499	-1.000	.330	.649	.527	0.000
CAL	75-76	.374	.581	.716	-.254	.715	.702	.718	.583	.536	.885	0.000
VER	76-77	.465	.479	-.508	.633	.617	.722	-1.000	.526	.618	.724	0.000
VER	77-78	.503	.725	.472	.648	.762	.657	-1.000	.553	.726	.724	0.000
VER	78-79	.690	.814	.561	.506	.804	.840	-1.000	.808	.828	.822	0.000
VER	79-80	.845	.763	.663	.686	.836	.736	-1.000	.481	.854	.859	0.000

SNOWMELT SEASON

CAL	70-71	.798	.604	-.029	.589	.334	.072	-1.000	.206	.458	.593	0.000
CAL	71-72	.385	.559	.549	.736	.318	.743	-1.000	.786	.630	.727	0.000
CAL	72-73	.396	.476	-.403	.595	.388	.679	-1.000	.185	.087	.506	0.000
CAL	73-74	.474	.526	.178	.449	.517	.718	-1.000	.765	.760	.554	0.000
CAL	74-75	-.533	-.200	-.716	-.328	-1.286	.291	-1.000	.447	-.148	-.239	0.000
CAL	75-76	.349	.354	.551	-1.803	.595	.420	.613	.287	.428	.888	0.000
VER	76-77	.812	.525	-2.266	.487	.814	.689	-1.000	.684	.740	.682	0.000
VER	77-78	.524	.649	.320	.510	.741	.738	-1.000	.565	.715	.829	0.000
VER	78-79	.539	.660	-.126	-.354	.710	.671	-1.000	.570	.644	.646	0.000
VER	79-80	.545	.621	.309	.427	.749	.454	-1.000	.466	.603	.586	0.000

ANNUAL CRITERION VALUES

R

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.032	.000	-.072	-.038	-.034	.041	-.092	.009	-.023	-1.000	-.166
CAL	70-71	.127	.169	.023	-.023	.215	.094	.036	.084	.145	-1.000	.181
CAL	71-72	-.095	-.146	-.097	-.208	-.056	-.055	-.064	-.076	-.077	-1.000	.379
CAL	72-73	-.114	-.119	-.170	-.214	-.064	-.039	-.084	-.075	-.068	-1.000	.105
CAL	73-74	-.002	.011	-.029	-.038	-.016	.135	-.009	.078	.074	-1.000	-.110
CAL	74-75	-.029	.061	-.027	.090	.036	.048	-.013	-.006	.037	-1.000	-.167
VER	75-76	-.043	-.144	-.179	-.086	-.045	-.064	-.131	-.084	-.019	-1.000	.276
VER	76-77	-.069	-.032	-.036	-.068	-.070	.057	-.091	.014	.014	-1.000	-.130
VER	77-78	-.008	.012	-.160	.024	-.010	.052	-.004	.032	.076	-1.000	-.030
VER	78-79	-.143	-.057	-.173	-.169	.013	-.041	-.047	-.124	-.094	-1.000	-.012

SNOWMELT SEASON

CAL	69-70	-.049	-.047	-.122	-.060	-.083	-.076	-.067	.009	-.051	-1.000	-.149
CAL	70-71	-.055	.076	-.070	-.113	.176	-.108	.009	-.008	.032	-1.000	.230
CAL	71-72	-.123	-.080	-.135	-.131	-.042	-.088	.015	-.048	-.135	-1.000	.431
CAL	72-73	-.160	-.100	-.280	-.166	.025	-.024	-.019	-.065	-.095	-1.000	.069
CAL	73-74	-.036	-.019	-.032	-.069	-.022	.189	.042	.187	.094	-1.000	-.078
CAL	74-75	-.082	.028	-.029	.002	-.029	.034	.011	.005	-.043	-1.000	-.226
VER	75-76	-.044	-.140	-.151	-.045	.058	-.051	.025	-.051	-.093	-1.000	.516
VER	76-77	-.056	.018	-.011	.028	-.049	.026	.032	.006	.003	-1.000	-.043
VER	77-78	-.086	-.055	-.261	-.026	-.081	.054	.008	.155	.114	-1.000	-.024
VER	78-79	-.232	-.040	-.363	-.250	-.048	-.193	.005	-.219	-.221	-1.000	-.016

ANNUAL CRITERION VALUES

NTD

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.945	.839	.873	.947	.934	.797	.952	.953	.851	-1.000	.745
CAL	70-71	.810	.591	.764	.793	.777	.789	.861	.831	.708	-1.000	.518
CAL	71-72	.932	.776	.756	.847	.895	.906	.897	.891	.860	-1.000	.608
CAL	72-73	.908	.778	.727	.853	.941	.898	.909	.904	.892	-1.000	.762
CAL	73-74	.947	.875	.871	.832	.935	.493	.919	.814	.868	-1.000	.872
CAL	74-75	.900	.831	.883	.868	.903	.776	.891	.929	.875	-1.000	.846
VER	75-76	.780	.539	.628	.581	.681	.855	.757	.800	.724	-1.000	.180
VER	76-77	.881	.812	.710	.785	.861	.754	.797	.834	.756	-1.000	.742
VER	77-78	.925	.920	.850	.927	.931	.766	.866	.843	.491	-1.000	.788
VER	78-79	.863	.844	.685	.836	.925	.673	.876	.818	.856	-1.000	.743

SNOWMELT SEASON

CAL	69-70	.935	.805	.788	.924	.907	.942	.942	.949	.784	-1.000	.656
CAL	70-71	.802	.599	.568	.689	.586	.712	.825	.717	.459	-1.000	.062
CAL	71-72	.891	.840	.558	.853	.859	.880	.855	.834	.778	-1.000	.309
CAL	72-73	.835	.866	.435	.805	.922	.821	.846	.820	.789	-1.000	.527
CAL	73-74	.947	.877	.846	.902	.895	.045	.903	.715	.784	-1.000	.787
CAL	74-75	.852	.793	.813	.842	.863	.629	.866	.887	.810	-1.000	.689
VER	75-76	.712	.421	.430	.600	.649	.752	.802	.622	.449	-1.000	-1.062
VER	76-77	.772	.741	.375	.737	.743	.676	.666	.669	.425	-1.000	.566
VER	77-78	.891	.929	.745	.925	.900	.576	.830	.762	.102	-1.000	.643
VER	78-79	.803	.832	.532	.763	.908	.627	.817	.743	.763	-1.000	.577

ANNUAL CRITERION VALUES

S

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.280	.479	.426	.276	.308	.538	.262	.258	.460	-1.000	.602
CAL	70-71	.351	.516	.391	.367	.381	.371	.301	.331	.436	-1.000	.560
CAL	71-72	.255	.460	.481	.380	.316	.298	.313	.321	.364	-1.000	.609
CAL	72-73	.288	.448	.497	.366	.232	.304	.286	.296	.313	-1.000	.465
CAL	73-74	.220	.337	.342	.391	.242	.678	.271	.410	.346	-1.000	.341
CAL	74-75	.322	.419	.348	.371	.317	.483	.337	.272	.361	-1.000	.401
VER	75-76	.391	.566	.508	.539	.471	.317	.411	.373	.437	-1.000	.754
VER	76-77	.286	.359	.446	.384	.309	.411	.373	.338	.409	-1.000	.421
VER	77-78	.288	.297	.407	.285	.276	.509	.385	.417	.751	-1.000	.484
VER	78-79	.391	.418	.594	.428	.289	.605	.372	.451	.401	-1.000	.536

SNOWMELT SEASON

CAL	69-70	.224	.389	.406	.243	.268	.212	.213	.199	.409	-1.000	.517
CAL	70-71	.225	.320	.332	.281	.325	.271	.211	.269	.371	-1.000	.489
CAL	71-72	.226	.274	.456	.263	.257	.237	.261	.279	.323	-1.000	.569
CAL	72-73	.244	.219	.450	.265	.167	.254	.235	.254	.275	-1.000	.412
CAL	73-74	.155	.236	.264	.211	.219	.657	.210	.359	.313	-1.000	.310
CAL	74-75	.246	.291	.277	.255	.237	.390	.234	.215	.279	-1.000	.357
VER	75-76	.281	.399	.395	.331	.310	.261	.233	.322	.389	-1.000	.752
VER	76-77	.264	.281	.437	.283	.280	.314	.319	.318	.419	-1.000	.364
VER	77-78	.246	.199	.377	.204	.236	.486	.307	.364	.707	-1.000	.446
VER	78-79	.346	.320	.533	.380	.237	.476	.333	.395	.380	-1.000	.507

ANNUAL CRITERION VALUES

NS

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.784	.366	.500	.790	.739	.203	.811	.816	.417	-1.000	0.000
CAL	70-71	.607	.151	.511	.570	.536	.561	.711	.650	.394	-1.000	0.000
CAL	71-72	.825	.428	.376	.610	.731	.760	.736	.722	.642	-1.000	0.000
CAL	72-73	.615	.069	-.145	.381	.750	.572	.620	.595	.546	-1.000	0.000
CAL	73-74	.585	.026	-.004	-.312	.496	-2.950	.368	-.447	-.028	-1.000	0.000
CAL	74-75	.353	-.095	.244	.144	.374	-.453	.291	.539	.187	-1.000	0.000
VER	75-76	.731	.437	.546	.488	.610	.824	.703	.756	.664	-1.000	0.000
VER	76-77	.538	.273	-.124	.169	.462	.046	.214	.357	.054	-1.000	0.000
VER	77-78	.646	.624	.292	.655	.676	-.105	.368	.259	-1.402	-1.000	0.000
VER	78-79	.467	.392	-.227	.362	.709	-.275	.518	.291	.438	-1.000	0.000

SNOWMELT SEASON

CAL	69-70	.812	.433	.384	.780	.731	.832	.831	.851	.374	-1.000	0.000
CAL	70-71	.789	.572	.539	.669	.559	.693	.814	.698	.424	-1.000	0.000
CAL	71-72	.843	.769	.360	.787	.796	.827	.790	.760	.679	-1.000	0.000
CAL	72-73	.650	.717	-.194	.587	.836	.621	.673	.619	.554	-1.000	0.000
CAL	73-74	.750	.421	.274	.540	.504	-3.489	.543	-.342	-.016	-1.000	0.000
CAL	74-75	.524	.335	.399	.493	.561	-.192	.570	.637	.391	-1.000	0.000
VER	75-76	.860	.719	.724	.806	.830	.880	.904	.817	.733	-1.000	0.000
VER	76-77	.473	.402	-.442	.394	.408	.252	.229	.236	-.327	-1.000	0.000
VER	77-78	.695	.800	.286	.791	.720	-.188	.525	.332	-1.516	-1.000	0.000
VER	78-79	.533	.602	-.107	.438	.781	.118	.568	.392	.439	-1.000	0.000

ANNUAL CRITERION VALUES

R

CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

		URC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	66-67	.158	.036	.062	-1.000	.025	.051	-1.000	.039	-1.000	-1.000	-.075
CAL	67-68	-.054	.033	.145	-1.000	.003	-.006	-1.000	-.017	-1.000	-1.000	-.045
CAL	68-69	-.010	-.014	.290	-1.000	-.025	-.010	-1.000	.025	-1.000	-1.000	.020
CAL	69-70	-.056	-.097	.169	-1.000	-.082	-.076	-1.000	-.039	-1.000	-1.000	.207
CAL	70-71	-.083	.012	.085	-1.000	-.000	.003	-1.000	.026	-1.000	-1.000	.074
CAL	71-72	-.010	.045	-.135	-1.000	-.013	-.007	-1.000	.037	-1.000	-1.000	-.117
VER	72-73	.051	-.011	.400	-1.000	-.096	-.066	-1.000	-.077	-1.000	-1.000	.299
VER	73-74	-.100	-.052	.059	-1.000	-.110	-.081	-1.000	-.089	-1.000	-1.000	-.064
VER	74-75	.038	.056	.245	-1.000	.006	-.005	-1.000	.001	-1.000	-1.000	.176
VER	75-76	-.137	-.066	-.020	-1.000	-.155	-.121	-1.000	-.137	-1.000	-1.000	-.150

SNOWMELT SEASON

CAL	66-67	.126	.069	.069	-1.000	.010	.069	-1.000	.046	-1.000	-1.000	-.080
CAL	67-68	-.092	.035	.144	-1.000	-.021	-.013	-1.000	-.039	-1.000	-1.000	-.048
CAL	68-69	-.057	-.028	.365	-1.000	-.029	.008	-1.000	-.001	-1.000	-1.000	.039
CAL	69-70	-.086	-.118	.204	-1.000	-.100	-.062	-1.000	-.073	-1.000	-1.000	.265
CAL	70-71	-.084	.012	.091	-1.000	.005	.021	-1.000	.016	-1.000	-1.000	.053
CAL	71-72	-.016	.056	-.138	-1.000	-.020	.008	-1.000	.037	-1.000	-1.000	-.138
VER	72-73	-.030	-.065	.449	-1.000	-.138	-.069	-1.000	-.139	-1.000	-1.000	.304
VER	73-74	-.104	-.033	.056	-1.000	-.118	-.062	-1.000	-.076	-1.000	-1.000	-.075
VER	74-75	-.005	.028	.232	-1.000	-.024	-.010	-1.000	-.037	-1.000	-1.000	.135
VER	75-76	-.204	-.043	-.014	-1.000	-.160	-.105	-1.000	-.131	-1.000	-1.000	-.150

ANNUAL CRITERION VALUES

NTD

CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

		URC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	66-67	.934	.925	.880	-1.000	.958	.960	-1.000	.941	-1.000	-1.000	.911
CAL	67-68	.922	.934	.866	-1.000	.918	.918	-1.000	.910	-1.000	-1.000	.887
CAL	68-69	.936	.917	.682	-1.000	.922	.923	-1.000	.919	-1.000	-1.000	.873
CAL	69-70	.936	.881	.703	-1.000	.901	.931	-1.000	.924	-1.000	-1.000	.851
CAL	70-71	.926	.861	.863	-1.000	.938	.919	-1.000	.818	-1.000	-1.000	.820
CAL	71-72	.935	.809	.822	-1.000	.936	.898	-1.000	.838	-1.000	-1.000	.871
VER	72-73	.922	.927	.639	-1.000	.883	.947	-1.000	.802	-1.000	-1.000	.617
VER	73-74	.913	.912	.816	-1.000	.925	.899	-1.000	.882	-1.000	-1.000	.747
VER	74-75	.954	.930	.823	-1.000	.955	.939	-1.000	.896	-1.000	-1.000	.801
VER	75-76	.819	.865	.849	-1.000	.879	.863	-1.000	.821	-1.000	-1.000	.635

SNOWMELT SEASON

CAL	66-67	.895	.877	.798	-1.000	.933	.941	-1.000	.901	-1.000	-1.000	.850
CAL	67-68	.863	.892	.786	-1.000	.862	.856	-1.000	.840	-1.000	-1.000	.796
CAL	68-69	.884	.845	.390	-1.000	.850	.860	-1.000	.849	-1.000	-1.000	.757
CAL	69-70	.904	.823	.539	-1.000	.842	.903	-1.000	.879	-1.000	-1.000	.761
CAL	70-71	.853	.722	.725	-1.000	.875	.837	-1.000	.637	-1.000	-1.000	.642
CAL	71-72	.891	.675	.695	-1.000	.892	.829	-1.000	.723	-1.000	-1.000	.780
VER	72-73	.882	.883	.356	-1.000	.793	.910	-1.000	.651	-1.000	-1.000	.316
VER	73-74	.852	.852	.688	-1.000	.872	.830	-1.000	.800	-1.000	-1.000	.570
VER	74-75	.929	.888	.706	-1.000	.926	.897	-1.000	.828	-1.000	-1.000	.675
VER	75-76	.610	.719	.678	-1.000	.741	.714	-1.000	.626	-1.000	-1.000	.215

ANNUAL CRITERION VALUES

S

CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	66-67	.302	.323	.409	-1.000	.242	.236	-1.000	.286	-1.000	-1.000	.351
CAL	67-68	.314	.289	.412	-1.000	.322	.323	-1.000	.337	-1.000	-1.000	.378
CAL	68-69	.262	.299	.586	-1.000	.291	.289	-1.000	.296	-1.000	-1.000	.370
CAL	69-70	.277	.379	.598	-1.000	.345	.288	-1.000	.302	-1.000	-1.000	.424
CAL	70-71	.299	.408	.405	-1.000	.273	.312	-1.000	.467	-1.000	-1.000	.465
CAL	71-72	.313	.535	.517	-1.000	.309	.391	-1.000	.493	-1.000	-1.000	.440
VER	72-73	.313	.302	.674	-1.000	.384	.258	-1.000	.499	-1.000	-1.000	.695
VER	73-74	.352	.355	.513	-1.000	.328	.379	-1.000	.411	-1.000	-1.000	.601
VER	74-75	.272	.335	.533	-1.000	.268	.313	-1.000	.409	-1.000	-1.000	.564
VER	75-76	.436	.377	.398	-1.000	.357	.380	-1.000	.434	-1.000	-1.000	.619

SNOWMELT SEASON

CAL	66-67	.235	.255	.325	-1.000	.188	.175	-1.000	.227	-1.000	-1.000	.280
CAL	67-68	.247	.220	.309	-1.000	.248	.254	-1.000	.267	-1.000	-1.000	.302
CAL	68-69	.208	.240	.477	-1.000	.236	.229	-1.000	.238	-1.000	-1.000	.301
CAL	69-70	.225	.306	.494	-1.000	.290	.227	-1.000	.253	-1.000	-1.000	.356
CAL	70-71	.233	.321	.319	-1.000	.215	.245	-1.000	.366	-1.000	-1.000	.364
CAL	71-72	.244	.421	.407	-1.000	.242	.305	-1.000	.388	-1.000	-1.000	.346
VER	72-73	.233	.233	.545	-1.000	.309	.204	-1.000	.401	-1.000	-1.000	.562
VER	73-74	.281	.281	.408	-1.000	.262	.301	-1.000	.326	-1.000	-1.000	.479
VER	74-75	.202	.254	.412	-1.000	.206	.244	-1.000	.315	-1.000	-1.000	.433
VER	75-76	.345	.293	.314	-1.000	.282	.296	-1.000	.339	-1.000	-1.000	.491

ANNUAL CRITERION VALUES

NS

CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	66-67	.260	.153	-.357	-1.000	.526	.548	-1.000	.335	-1.000	-1.000	0.000
CAL	67-68	.311	.416	-.186	-1.000	.277	.272	-1.000	.205	-1.000	-1.000	0.000
CAL	68-69	.499	.349	-1.506	-1.000	.383	.392	-1.000	.362	-1.000	-1.000	0.000
CAL	69-70	.573	.201	-.988	-1.000	.339	.540	-1.000	.493	-1.000	-1.000	0.000
CAL	70-71	.587	.229	.240	-1.000	.654	.548	-1.000	-.010	-1.000	-1.000	0.000
CAL	71-72	.493	-.476	-.381	-1.000	.507	.212	-1.000	-.255	-1.000	-1.000	0.000
VER	72-73	.797	.811	.058	-1.000	.695	.862	-1.000	.483	-1.000	-1.000	0.000
VER	73-74	.657	.651	.273	-1.000	.702	.602	-1.000	.534	-1.000	-1.000	0.000
VER	74-75	.768	.648	.108	-1.000	.773	.692	-1.000	.474	-1.000	-1.000	0.000
VER	75-76	.503	.630	.586	-1.000	.667	.624	-1.000	.509	-1.000	-1.000	0.000

SNOWMELT SEASON

CAL	66-67	.298	.176	-.346	-1.000	.551	.609	-1.000	.342	-1.000	-1.000	0.000
CAL	67-68	.328	.469	-.050	-1.000	.323	.293	-1.000	.219	-1.000	-1.000	0.000
CAL	68-69	.521	.362	-1.515	-1.000	.384	.423	-1.000	.377	-1.000	-1.000	0.000
CAL	69-70	.599	.261	-.931	-1.000	.337	.592	-1.000	.493	-1.000	-1.000	0.000
CAL	70-71	.590	.224	.231	-1.000	.650	.545	-1.000	-.014	-1.000	-1.000	0.000
CAL	71-72	.503	-.481	-.388	-1.000	.509	.220	-1.000	-.258	-1.000	-1.000	0.000
VER	72-73	.828	.829	.058	-1.000	.698	.869	-1.000	.490	-1.000	-1.000	0.000
VER	73-74	.656	.654	.273	-1.000	.702	.604	-1.000	.535	-1.000	-1.000	0.000
VER	74-75	.782	.656	.096	-1.000	.773	.684	-1.000	.472	-1.000	-1.000	0.000
VER	75-76	.504	.643	.590	-1.000	.670	.636	-1.000	.524	-1.000	-1.000	0.000

ANNUAL CRITERION VALUES

R

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.022	-.001	.027	-1.000	-.029	-.204	-1.000	-.064	-1.000	-1.000	.535
CAL	70-71	.080	.034	.079	-1.000	.101	-.083	-1.000	.043	-1.000	-1.000	-.011
CAL	71-72	.038	.130	.010	-1.000	.124	-.022	-1.000	.047	-1.000	-1.000	-.194
CAL	72-73	.087	-.019	.065	-1.000	.031	-.144	-1.000	.027	-1.000	-1.000	-.142
CAL	73-74	.057	.031	.041	-1.000	.035	-.158	-1.000	.038	-1.000	-1.000	.037
CAL	74-75	-.062	-.104	-.052	-1.000	-.120	-.252	-1.000	-.054	-1.000	-1.000	.033
VER	75-76	-.009	-.019	-.045	-1.000	.042	-.177	-1.000	.063	-1.000	-1.000	-.076
VER	76-77	.088	.038	.026	-1.000	-.000	-.120	-1.000	.122	-1.000	-1.000	.169
VER	77-78	.047	.034	.004	-1.000	.062	-.130	-1.000	.033	-1.000	-1.000	-.006
VER	78-79	-.052	-.024	-.090	-1.000	-.090	-.211	-1.000	-.017	-1.000	-1.000	-.164

SNOWMELT SEASON

CAL	69-70	.022	-.130	-.040	-1.000	-.053	-.030	-1.000	-.096	-1.000	-1.000	.461
CAL	70-71	.045	.045	.024	-1.000	.036	.099	-1.000	.058	-1.000	-1.000	-.066
CAL	71-72	-.069	.038	-.086	-1.000	.017	.127	-1.000	-.042	-1.000	-1.000	-.253
CAL	72-73	.007	-.083	.043	-1.000	-.079	.031	-1.000	.004	-1.000	-1.000	-.140
CAL	73-74	-.094	-.077	.019	-1.000	.007	-.006	-1.000	.026	-1.000	-1.000	.135
CAL	74-75	-.169	-.123	.009	-1.000	-.188	-.107	-1.000	-.010	-1.000	-1.000	.159
VER	75-76	-.079	-.087	.006	-1.000	.044	-.001	-1.000	.078	-1.000	-1.000	-.070
VER	76-77	-.057	-.074	-.013	-1.000	-.086	.007	-1.000	.055	-1.000	-1.000	.129
VER	77-78	-.084	-.068	-.081	-1.000	-.016	.026	-1.000	.019	-1.000	-1.000	-.007
VER	78-79	-.176	-.178	-.109	-1.000	-.180	-.094	-1.000	-.073	-1.000	-1.000	-.115

ANNUAL CRITERION VALUES

NTD

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.775	.761	.807	-1.000	.882	.727	-1.000	.748	-1.000	-1.000	.580
CAL	70-71	.878	.637	.745	-1.000	.847	.771	-1.000	.751	-1.000	-1.000	.720
CAL	71-72	.869	.713	.777	-1.000	.866	.837	-1.000	.732	-1.000	-1.000	.691
CAL	72-73	.865	.733	.600	-1.000	.899	.807	-1.000	.818	-1.000	-1.000	.732
CAL	73-74	.836	.612	.550	-1.000	.842	.548	-1.000	.640	-1.000	-1.000	.577
CAL	74-75	.821	.757	.732	-1.000	.892	.853	-1.000	.765	-1.000	-1.000	.445
VER	75-76	.886	.650	.818	-1.000	.900	.808	-1.000	.786	-1.000	-1.000	.605
VER	76-77	.869	.834	.734	-1.000	.903	.871	-1.000	.795	-1.000	-1.000	.556
VER	77-78	.765	.753	.687	-1.000	.860	.773	-1.000	.735	-1.000	-1.000	.618
VER	78-79	.856	.651	.786	-1.000	.857	.860	-1.000	.677	-1.000	-1.000	.578

SNOWMELT SEASON

CAL	69-70	.706	.716	.755	-1.000	.879	.658	-1.000	.685	-1.000	-1.000	.446
CAL	70-71	.830	.341	.554	-1.000	.776	.623	-1.000	.560	-1.000	-1.000	.519
CAL	71-72	.751	.463	.536	-1.000	.799	.677	-1.000	.476	-1.000	-1.000	.319
CAL	72-73	.771	.567	.239	-1.000	.895	.685	-1.000	.685	-1.000	-1.000	.549
CAL	73-74	.653	.119	-.320	-1.000	.634	-.294	-1.000	.111	-1.000	-1.000	-.081
CAL	74-75	.734	.645	.526	-1.000	.824	.799	-1.000	.689	-1.000	-1.000	.002
VER	75-76	.843	.463	.719	-1.000	.867	.707	-1.000	.687	-1.000	-1.000	.310
VER	76-77	.804	.792	.534	-1.000	.854	.803	-1.000	.718	-1.000	-1.000	.295
VER	77-78	.647	.651	.519	-1.000	.799	.672	-1.000	.606	-1.000	-1.000	.472
VER	78-79	.796	.487	.702	-1.000	.787	.816	-1.000	.511	-1.000	-1.000	.419

ANNUAL CRITERION VALUES

S

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

		UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.933	.963	.865	-1.000	.676	1.028	-1.000	.988	-1.000	-1.000	1.275
CAL	70-71	.571	.984	.826	-1.000	.639	.781	-1.000	.816	-1.000	-1.000	.864
CAL	71-72	.558	.827	.728	-1.000	.566	.623	-1.000	.800	-1.000	-1.000	.859
CAL	72-73	.552	.776	.951	-1.000	.477	.660	-1.000	.642	-1.000	-1.000	.778
CAL	73-74	.509	.783	.843	-1.000	.499	.845	-1.000	.754	-1.000	-1.000	.817
CAL	74-75	.625	.729	.765	-1.000	.487	.566	-1.000	.716	-1.000	-1.000	1.102
VER	75-76	.515	.902	.650	-1.000	.481	.669	-1.000	.705	-1.000	-1.000	.958
VER	76-77	.623	.701	.887	-1.000	.537	.618	-1.000	.778	-1.000	-1.000	1.146
VER	77-78	.851	.872	.981	-1.000	.657	.837	-1.000	.904	-1.000	-1.000	1.084
VER	78-79	.630	.980	.769	-1.000	.627	.620	-1.000	.944	-1.000	-1.000	1.078

SNOWMELT SEASON

CAL	69-70	.584	.573	.532	-1.000	.374	.630	-1.000	.604	-1.000	-1.000	.801
CAL	70-71	.329	.646	.532	-1.000	.377	.489	-1.000	.528	-1.000	-1.000	.552
CAL	71-72	.318	.467	.434	-1.000	.286	.362	-1.000	.461	-1.000	-1.000	.526
CAL	72-73	.364	.502	.665	-1.000	.247	.428	-1.000	.428	-1.000	-1.000	.512
CAL	73-74	.318	.506	.620	-1.000	.326	.613	-1.000	.509	-1.000	-1.000	.561
CAL	74-75	.386	.446	.515	-1.000	.314	.335	-1.000	.417	-1.000	-1.000	.748
VER	75-76	.303	.559	.405	-1.000	.278	.413	-1.000	.427	-1.000	-1.000	.634
VER	76-77	.377	.388	.581	-1.000	.325	.378	-1.000	.452	-1.000	-1.000	.715
VER	77-78	.592	.589	.691	-1.000	.447	.570	-1.000	.625	-1.000	-1.000	.724
VER	78-79	.434	.688	.525	-1.000	.444	.412	-1.000	.672	-1.000	-1.000	.733

ANNUAL CRITERION VALUES

NS

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

		URC	CFQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
CAL	69-70	.464	.430	.540	-1.000	.719	.350	-1.000	.400	-1.000	-1.000	0.000
CAL	70-71	.563	-.298	.087	-1.000	.454	.183	-1.000	.109	-1.000	-1.000	0.000
CAL	71-72	.578	.072	.281	-1.000	.566	.474	-1.000	.132	-1.000	-1.000	0.000
CAL	72-73	.497	.005	-.493	-1.000	.625	.281	-1.000	.320	-1.000	-1.000	0.000
CAL	73-74	.613	.082	-.065	-1.000	.627	-.068	-1.000	.149	-1.000	-1.000	0.000
CAL	74-75	.678	.562	.518	-1.000	.805	.736	-1.000	.577	-1.000	-1.000	0.000
VER	75-76	.711	.113	.540	-1.000	.747	.513	-1.000	.458	-1.000	-1.000	0.000
VER	76-77	.705	.626	.401	-1.000	.781	.709	-1.000	.539	-1.000	-1.000	0.000
VER	77-78	.385	.353	.181	-1.000	.633	.404	-1.000	.305	-1.000	-1.000	0.000
VER	78-79	.658	.173	.492	-1.000	.661	.669	-1.000	.233	-1.000	-1.000	0.000

SNOWMELT SEASON

CAL	69-70	.469	.488	.558	-1.000	.782	.382	-1.000	.431	-1.000	-1.000	0.000
CAL	70-71	.646	-.368	.074	-1.000	.534	.218	-1.000	.085	-1.000	-1.000	0.000
CAL	71-72	.635	.212	.319	-1.000	.704	.526	-1.000	.231	-1.000	-1.000	0.000
CAL	72-73	.493	.040	-.687	-1.000	.767	.301	-1.000	.302	-1.000	-1.000	0.000
CAL	73-74	.679	.185	-.221	-1.000	.661	-.197	-1.000	.177	-1.000	-1.000	0.000
CAL	74-75	.733	.645	.525	-1.000	.824	.799	-1.000	.689	-1.000	-1.000	0.000
VER	75-76	.772	.222	.592	-1.000	.807	.575	-1.000	.547	-1.000	-1.000	0.000
VER	76-77	.722	.705	.339	-1.000	.794	.720	-1.000	.600	-1.000	-1.000	0.000
VER	77-78	.332	.338	.088	-1.000	.618	.379	-1.000	.253	-1.000	-1.000	0.000
VER	78-79	.649	.118	.487	-1.000	.633	.684	-1.000	.159	-1.000	-1.000	0.000

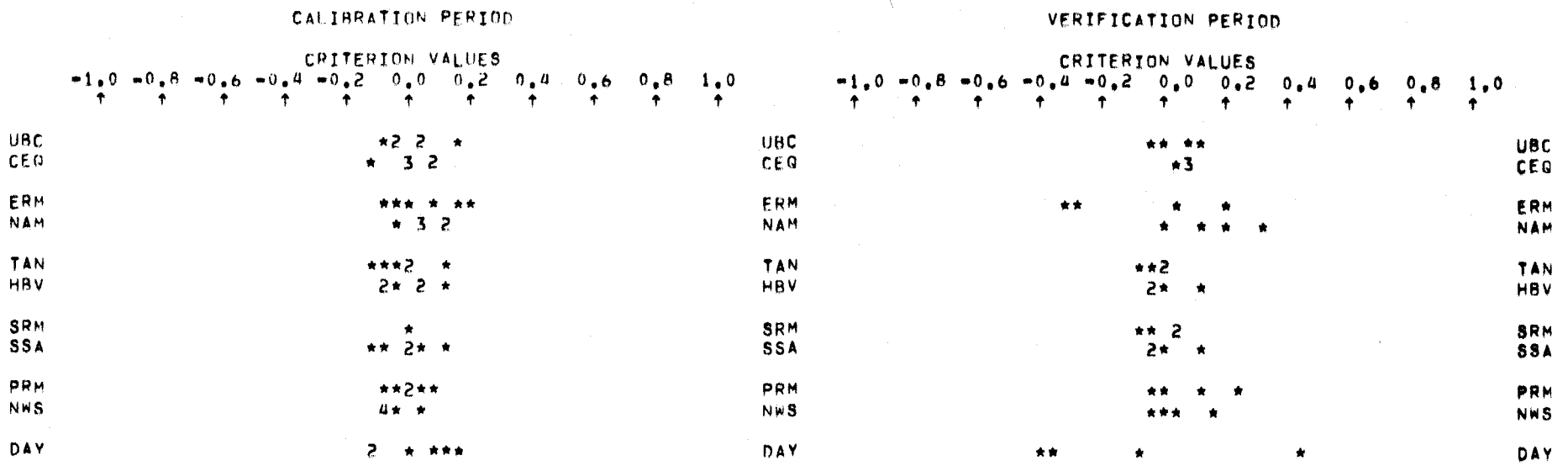
APPENDIX B

ANNUAL CRITERION VALUES

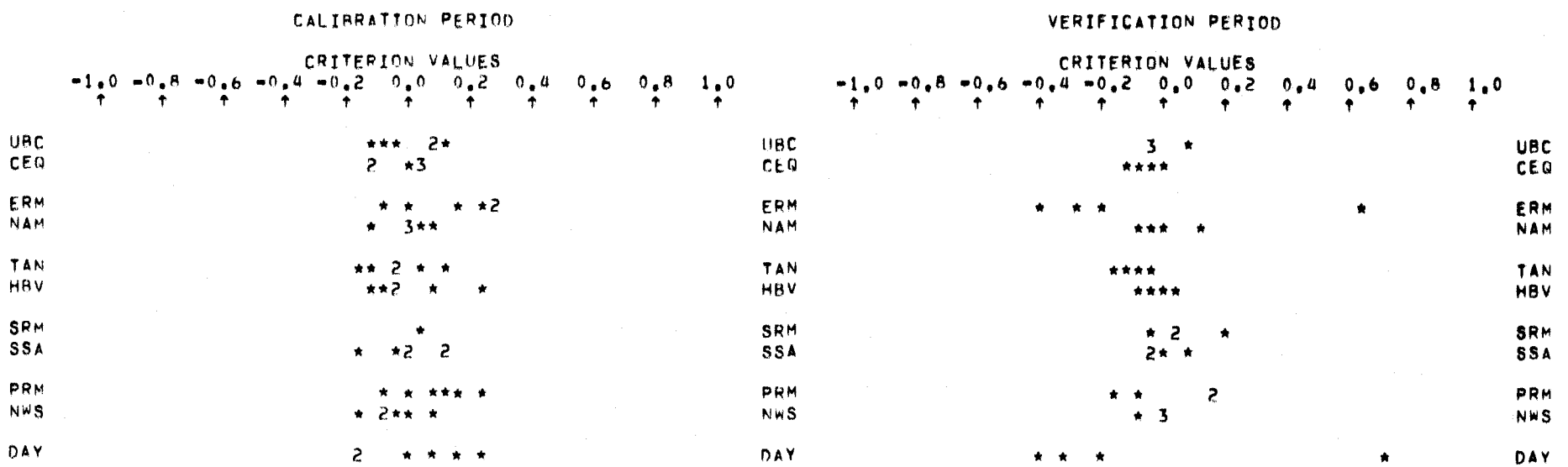
R

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



SNOWMELT SEASON

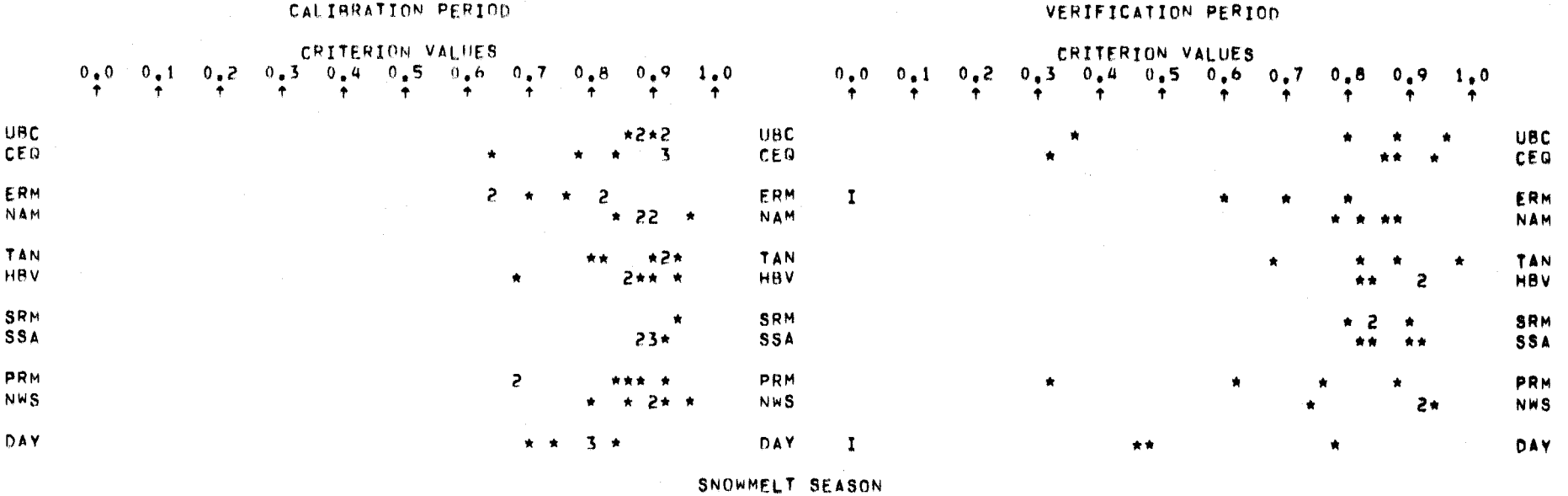


ANNUAL CRITERION VALUES

NTD

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



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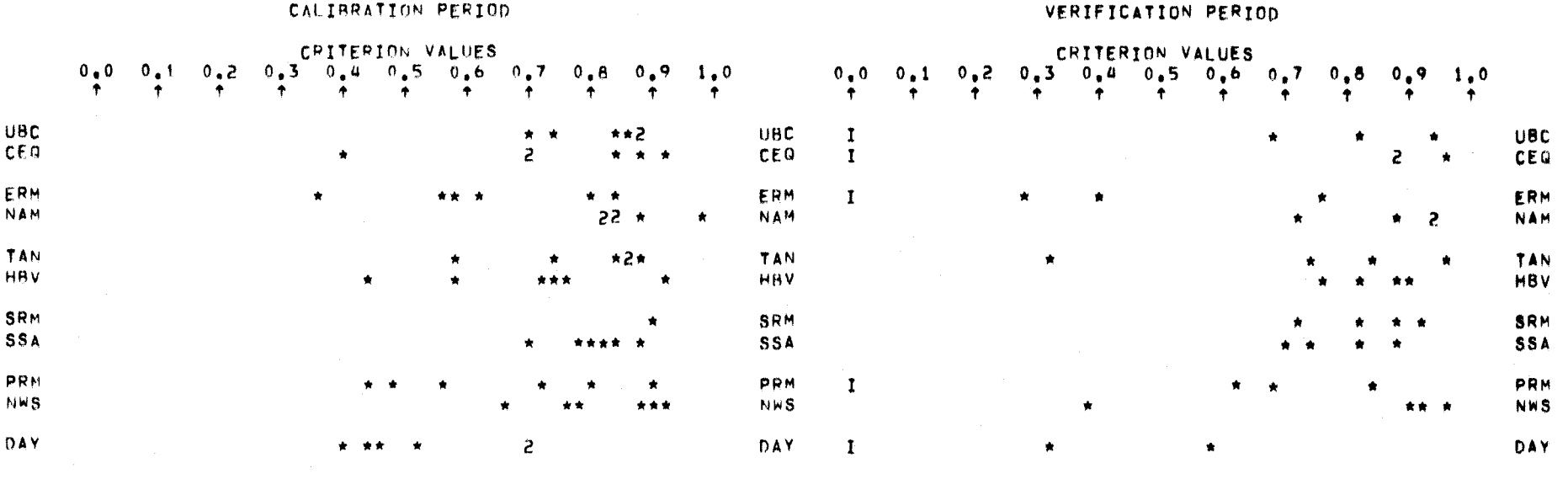


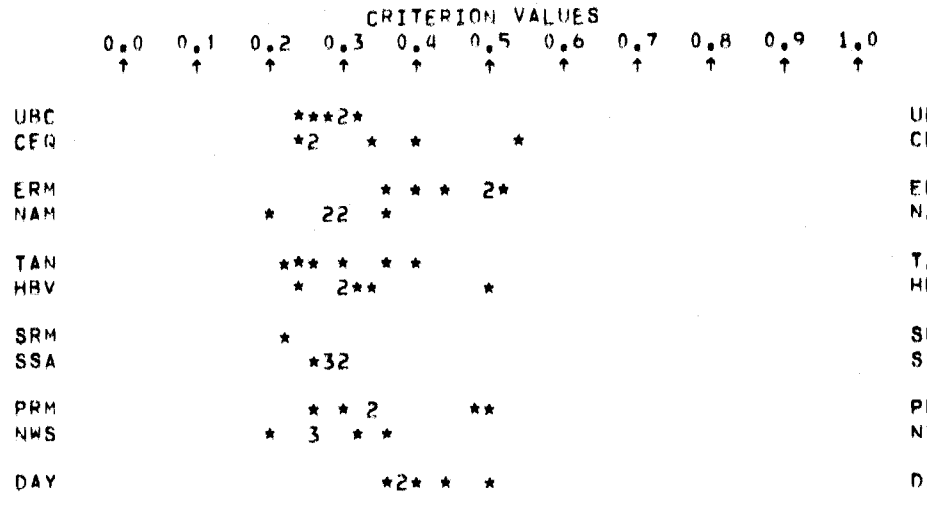
ANNUAL CRITERION VALUES

S

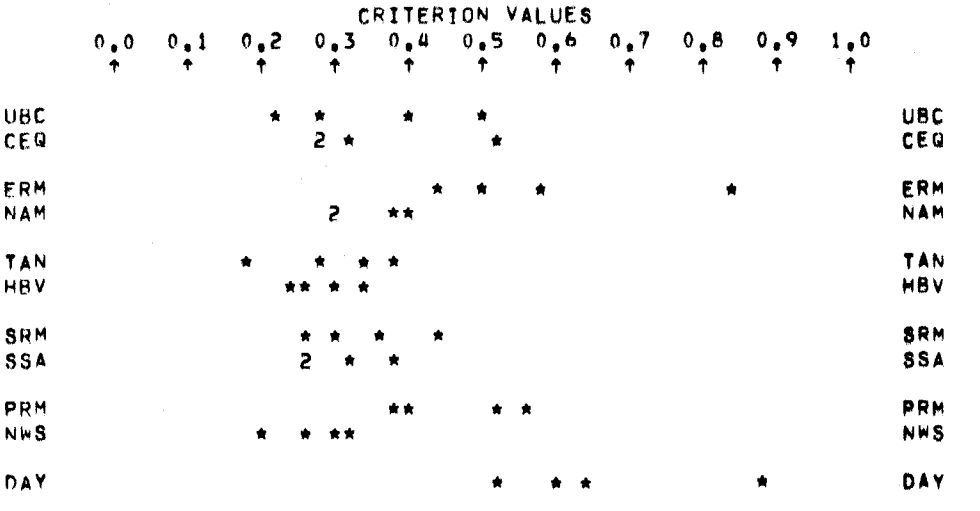
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

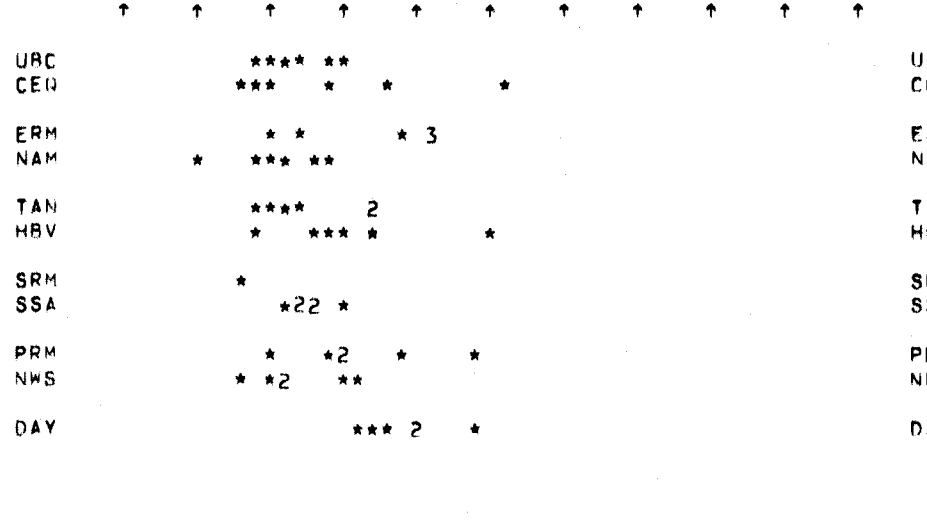


VERIFICATION PERIOD



SNOWMELT SEASON

CALIBRATION PERIOD



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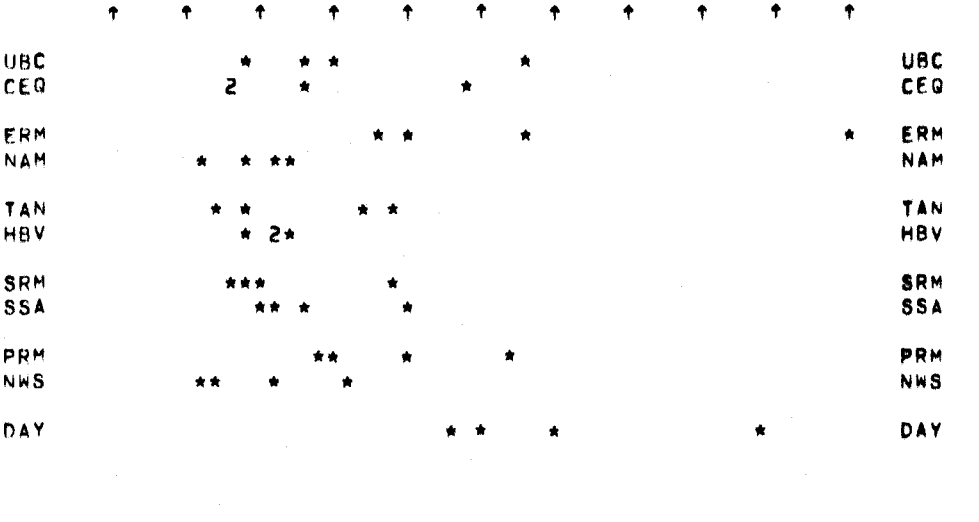


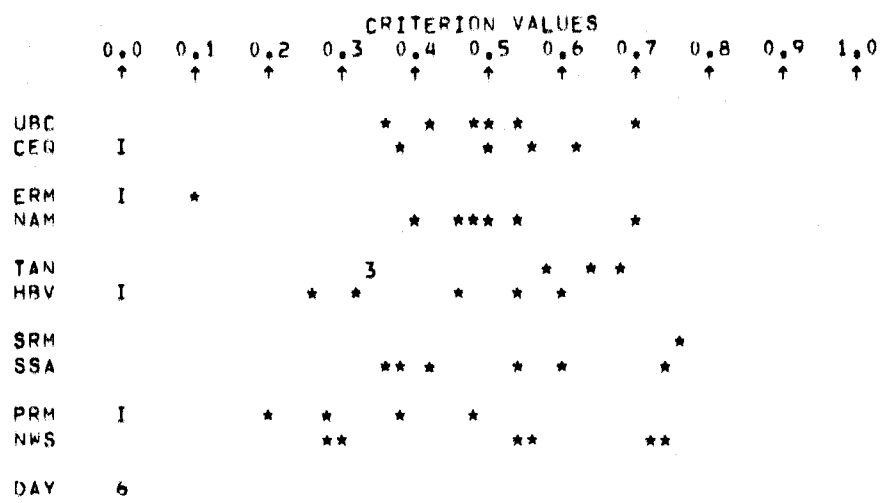
ANNUAL CRITERION VALUES

NS

CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD



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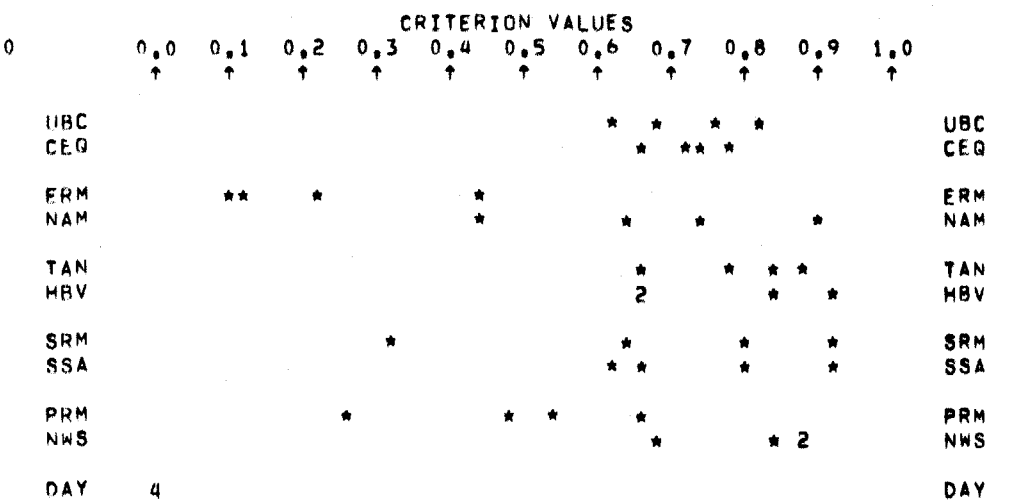
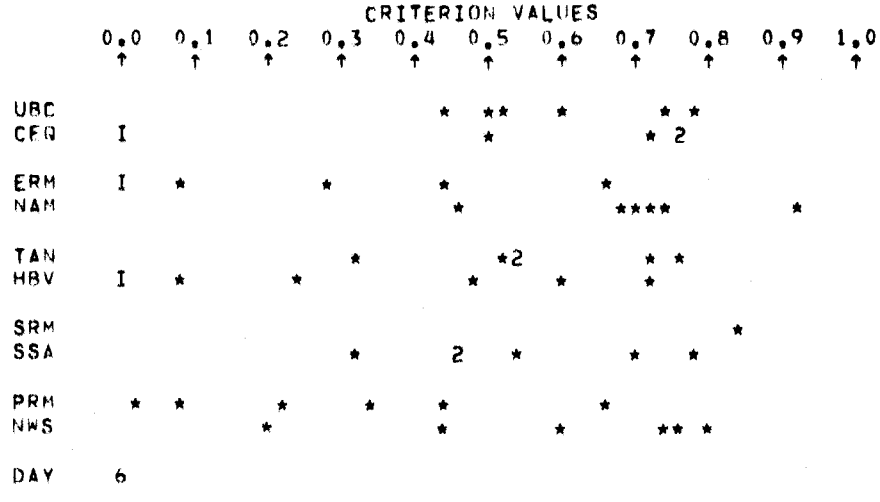
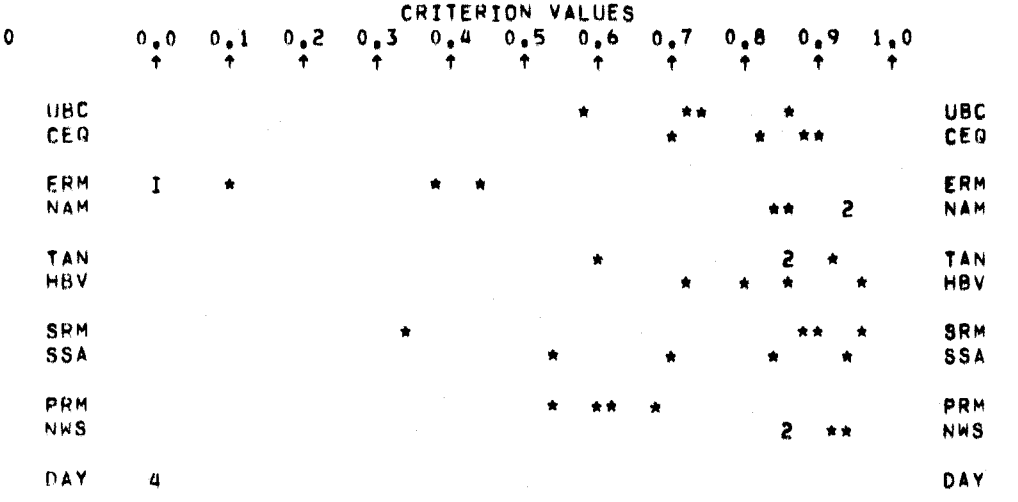


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD



ANNUAL CRITERION VALUES

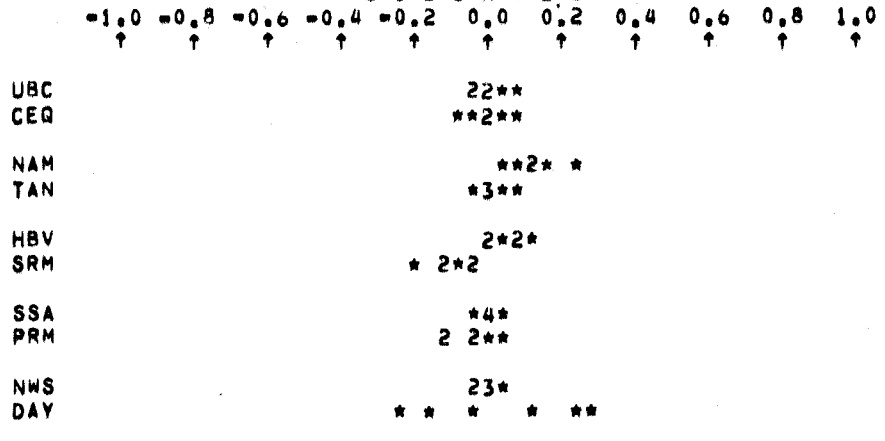
R

CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

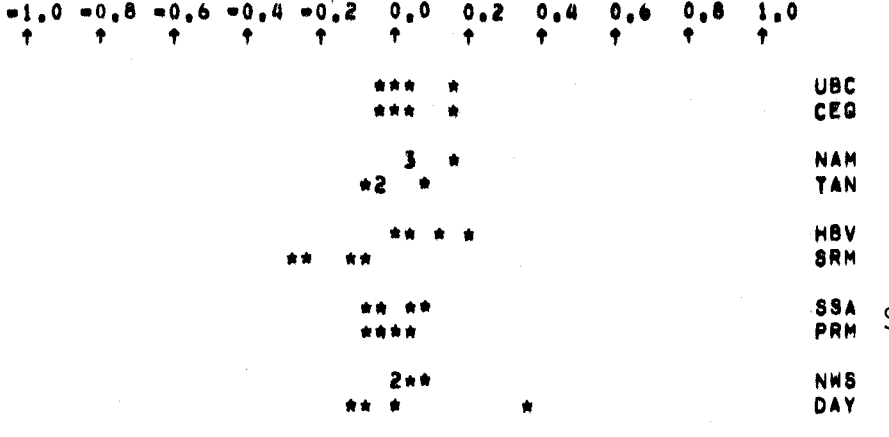
CALIBRATION PERIOD

CRITERION VALUES



VERIFICATION PERIOD

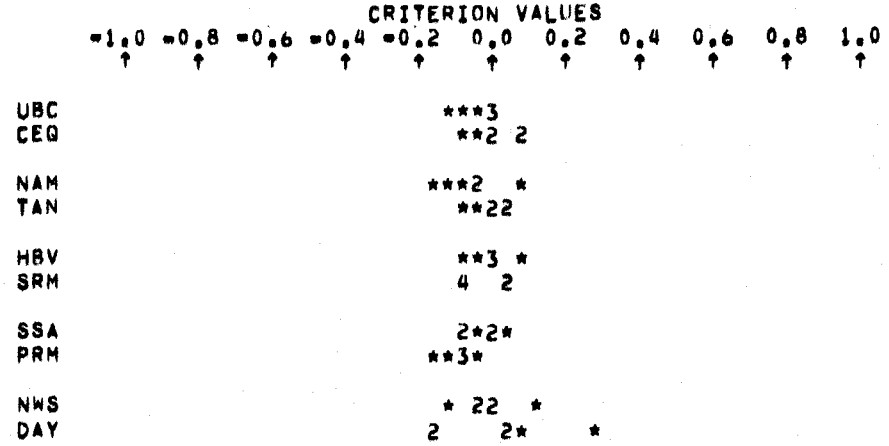
CRITERION VALUES



SNOWMELT SEASON

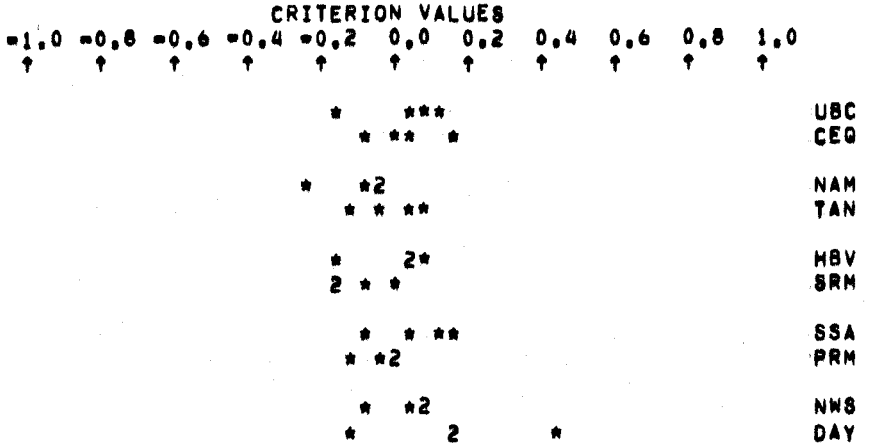
CALIBRATION PERIOD

CRITERION VALUES



VERIFICATION PERIOD

CRITERION VALUES



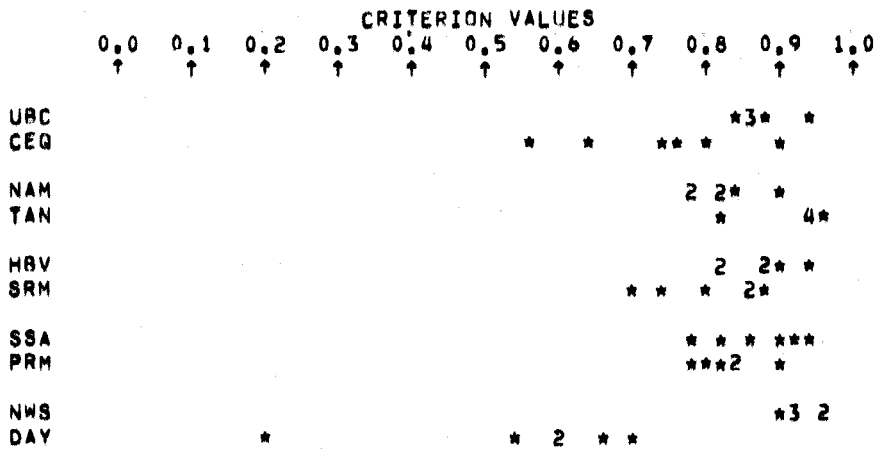
ANNUAL CRITERION VALUES

NTO

CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD



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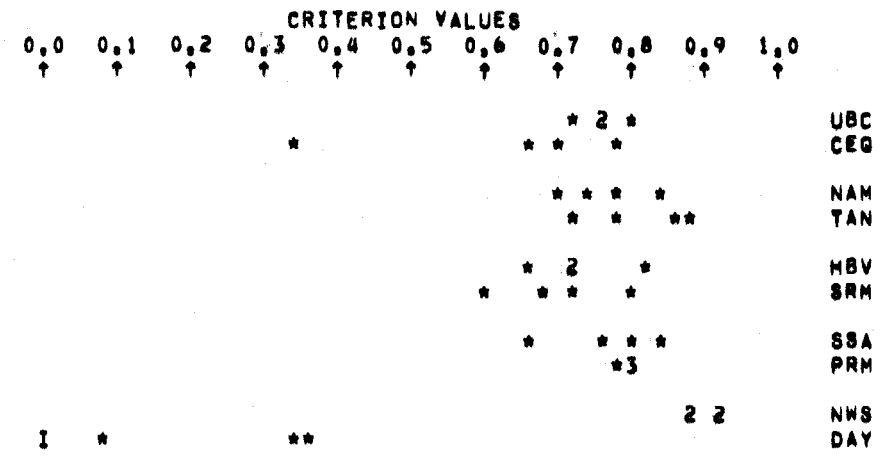
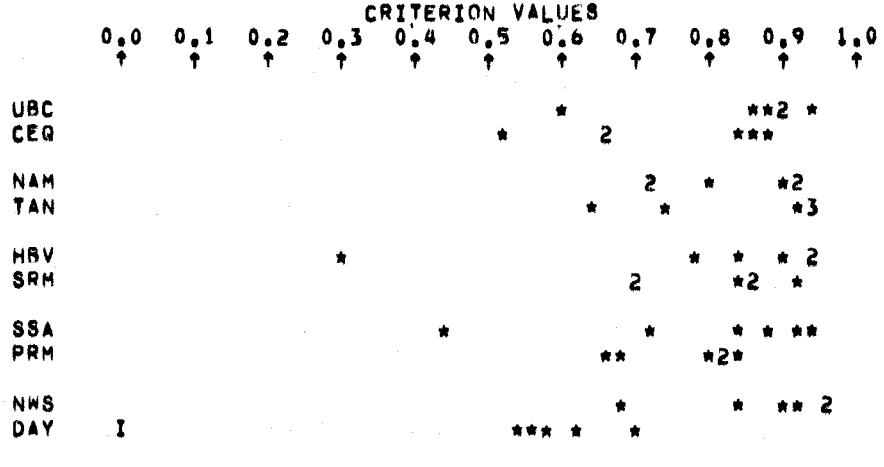


SNOWMELT SEASON

CALIBRATION PERIOD



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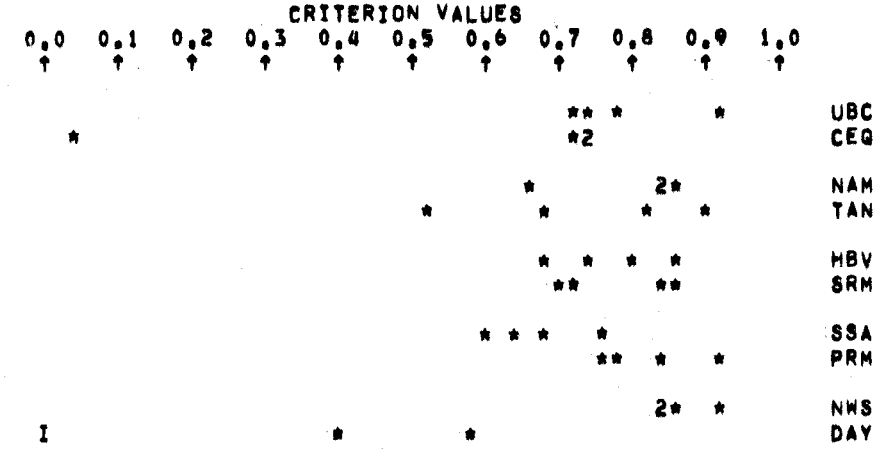


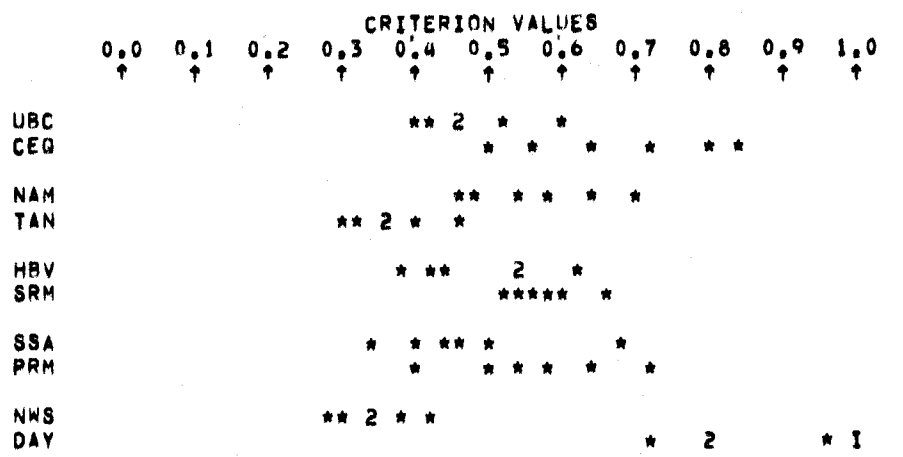
ANNUAL CRITERION VALUES

8

CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD



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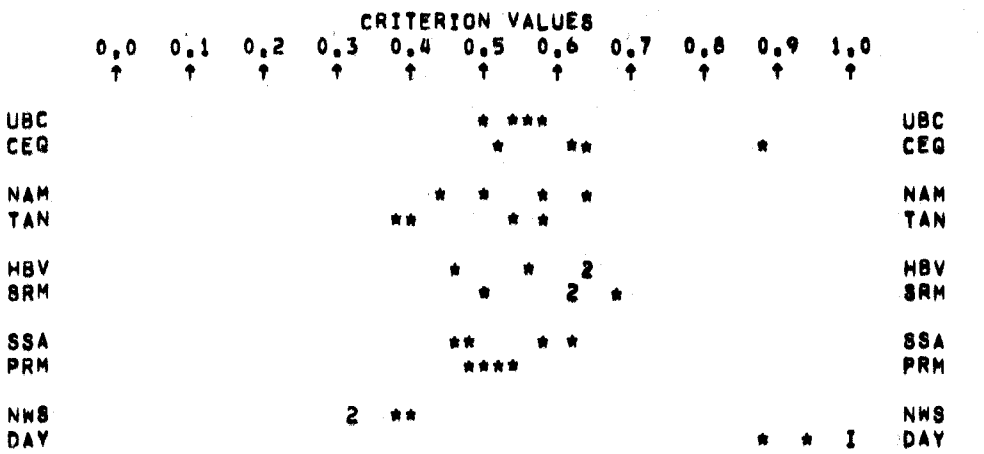
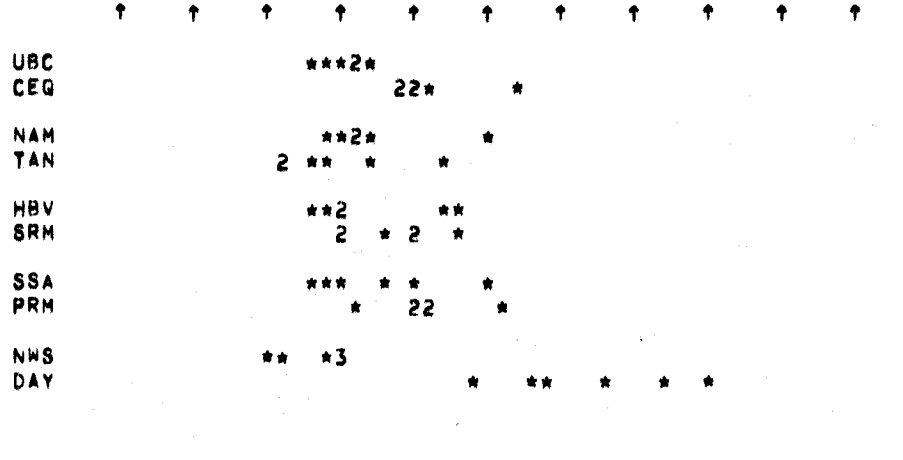


SNOWMELT SEASON

CALIBRATION PERIOD



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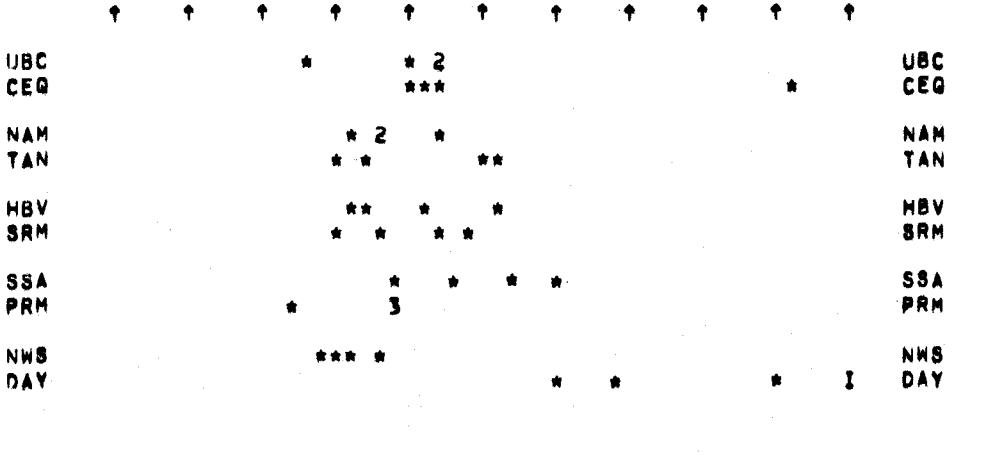


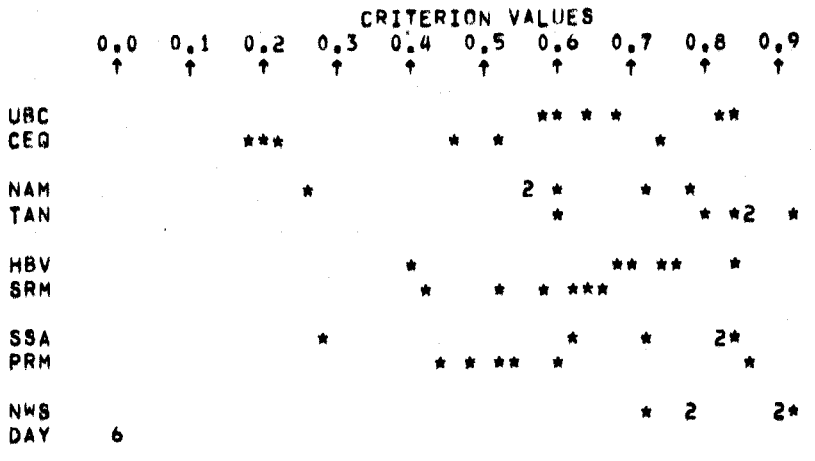
ANNUAL CRITERION VALUES

NS

CATCHMENT W3 - WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD



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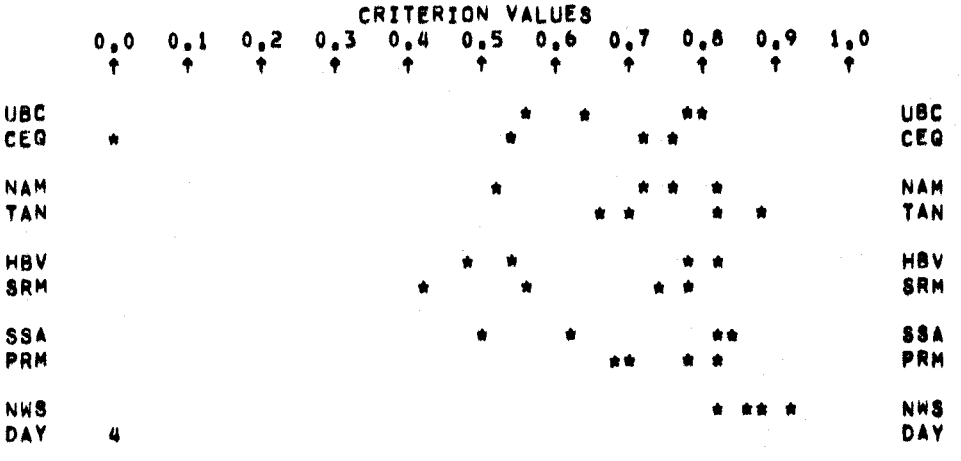
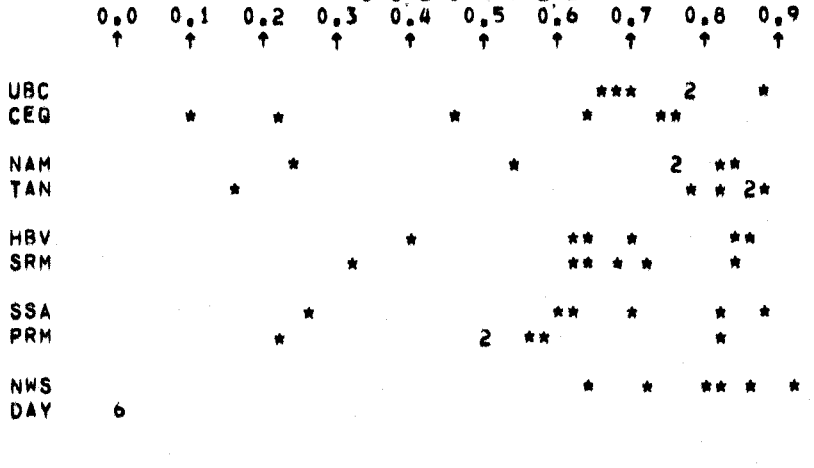


SNOWMELT SEASON

CALIBRATION PERIOD



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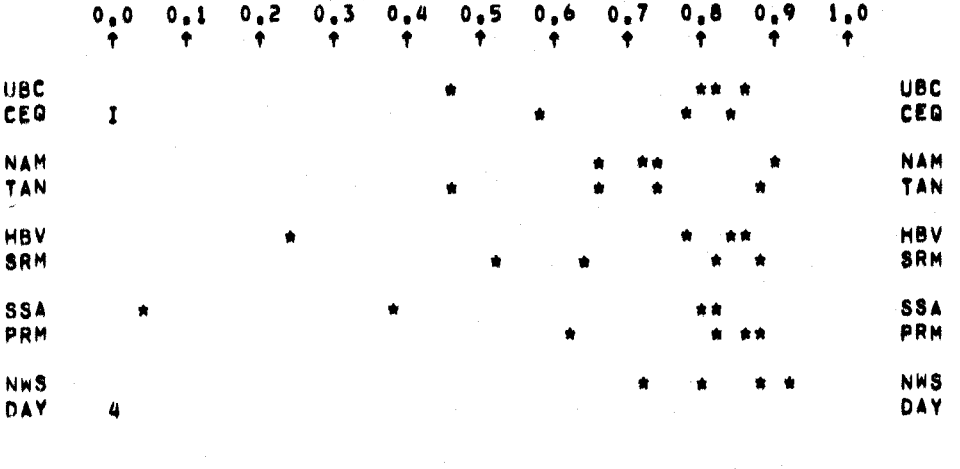
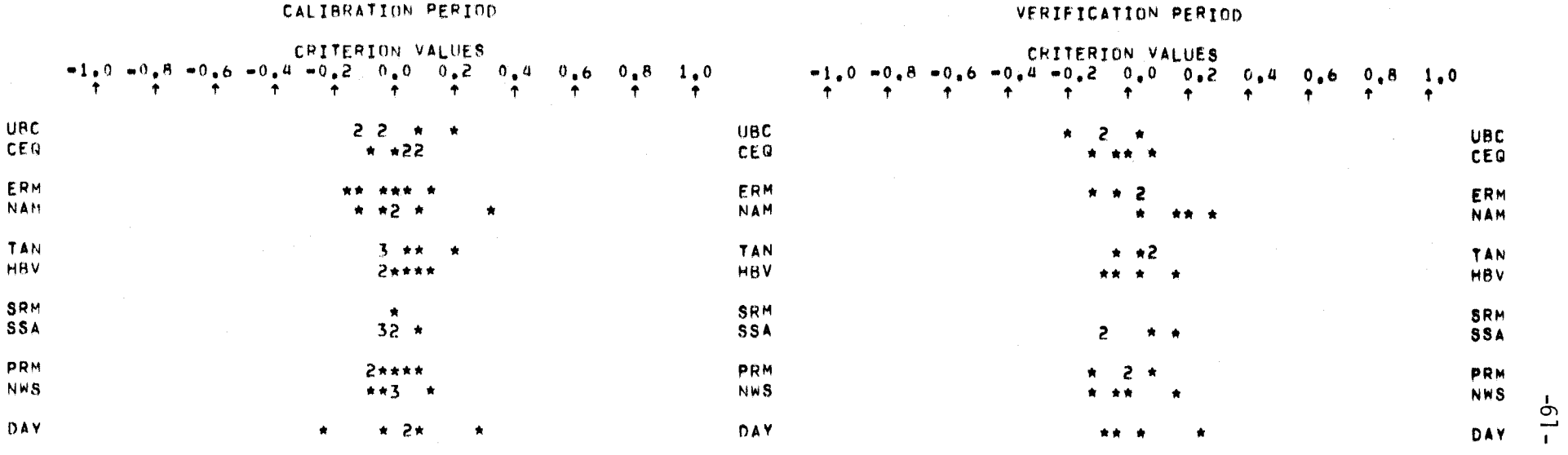


ANNUAL CRITERION VALUES

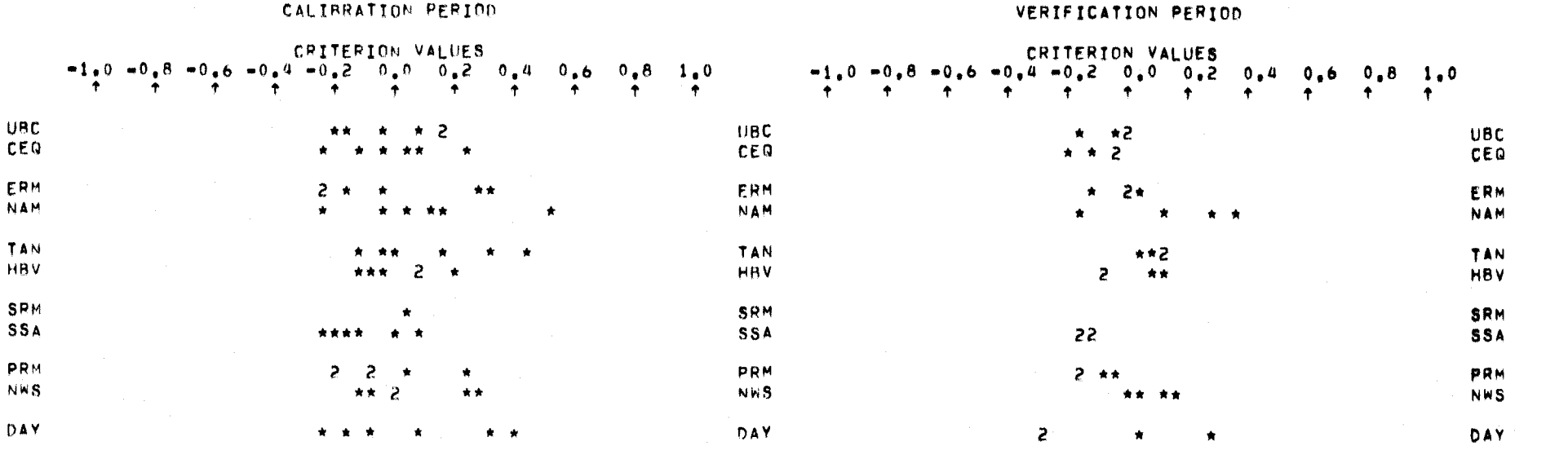
R

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



SNOWMELT SEASON

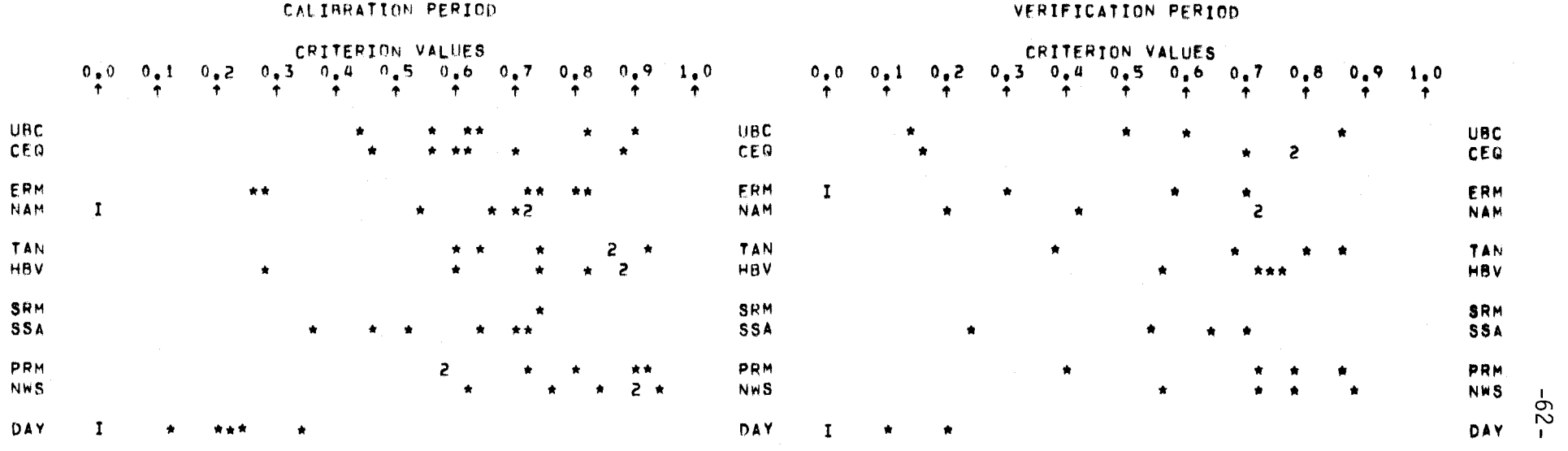


ANNUAL CRITERION VALUES

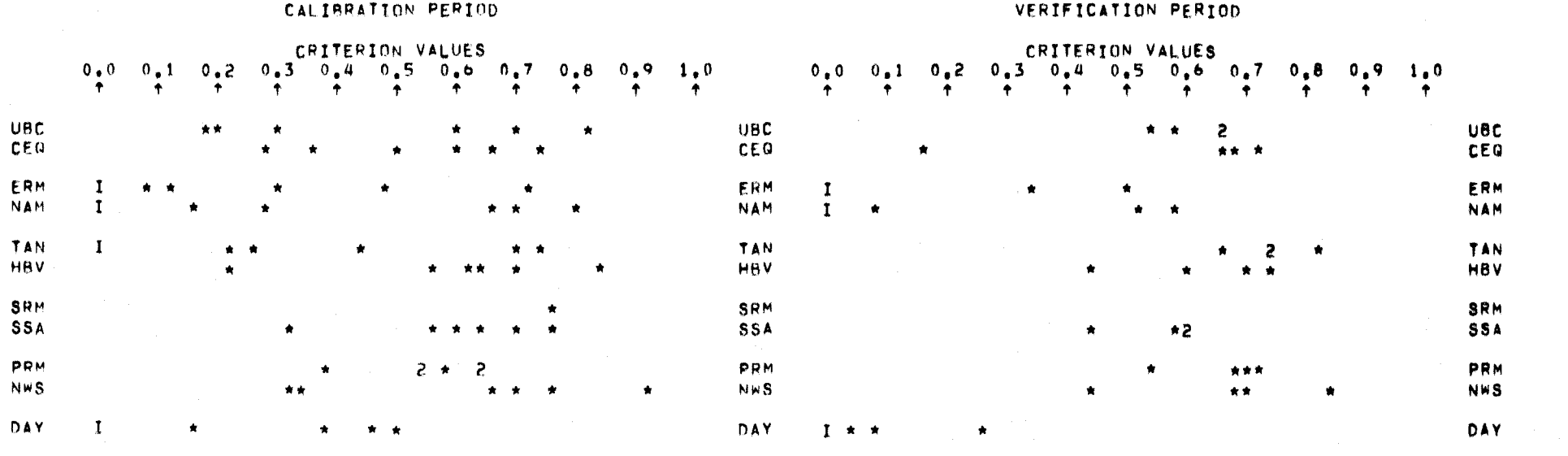
NTD

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



SNOWMELT SEASON



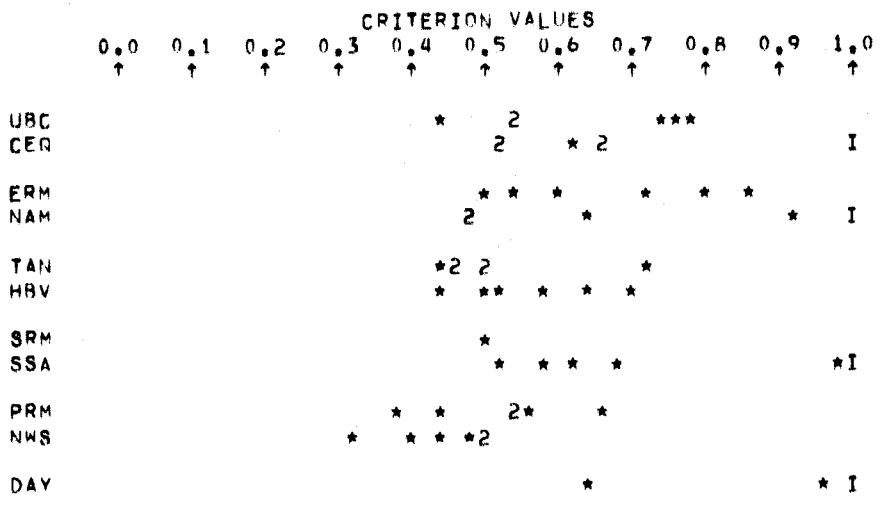
ANNUAL CRITERION VALUES

S

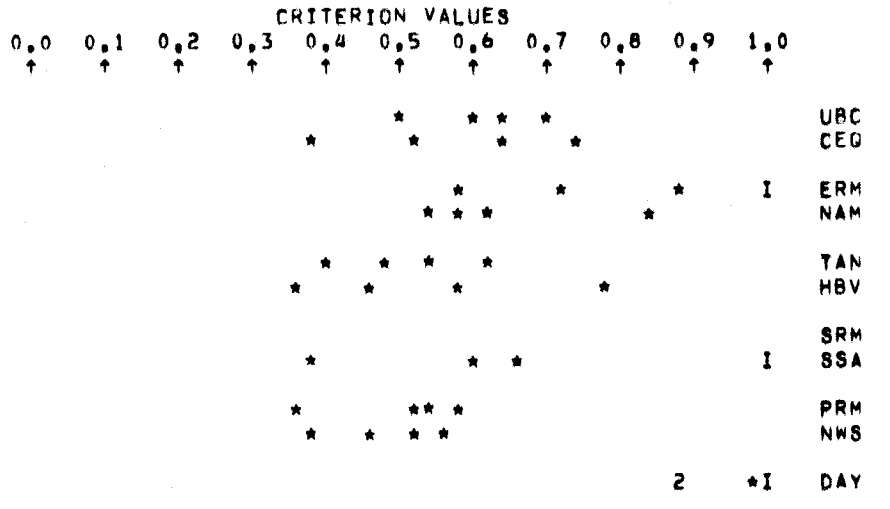
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

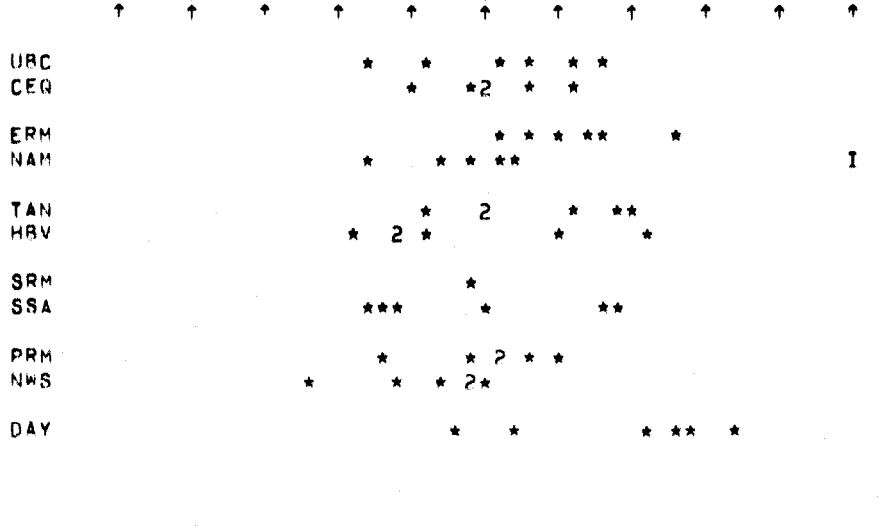


VERIFICATION PERIOD

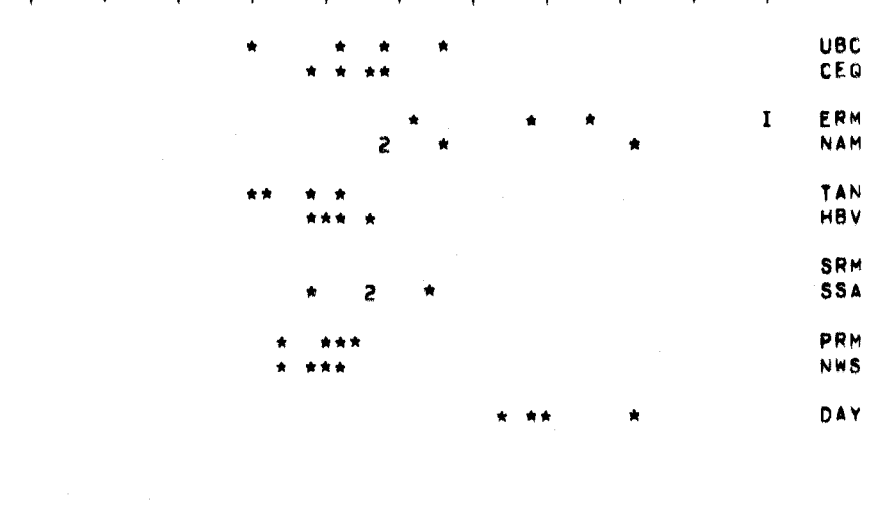


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD

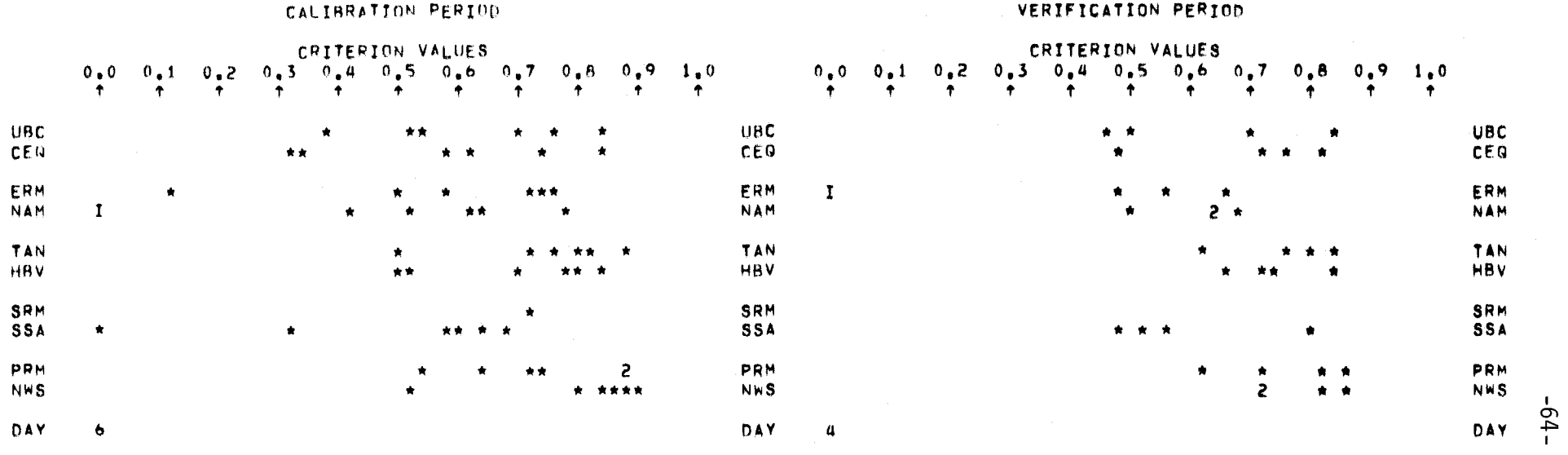


ANNUAL CRITERION VALUES

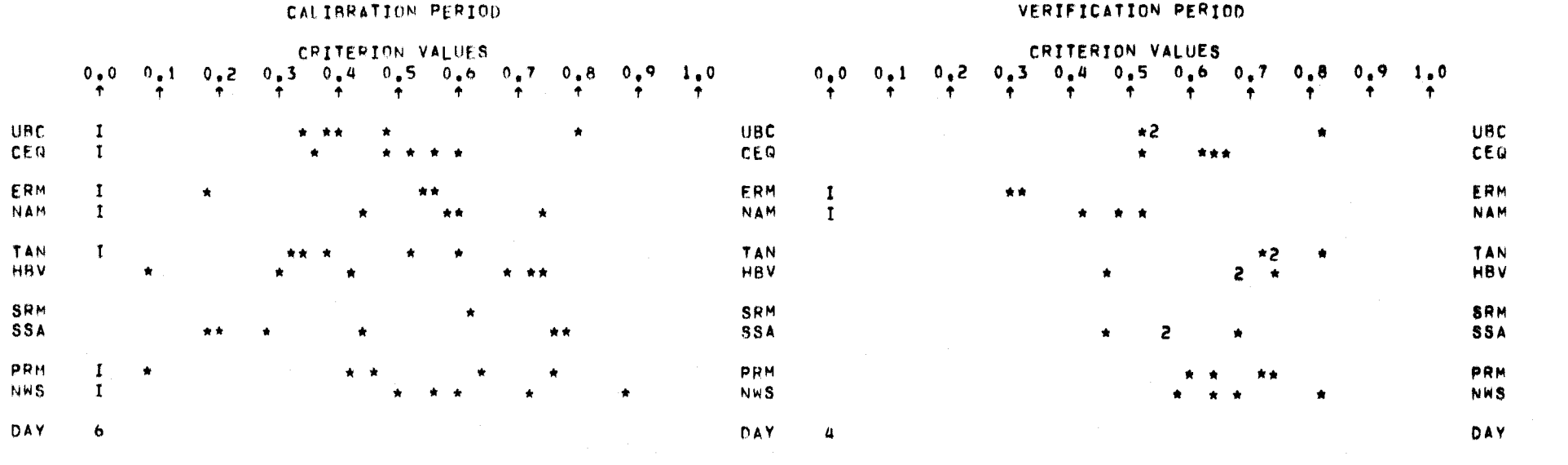
NS

CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



SNOWMELT SEASON



ANNUAL CRITERION VALUES

R

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC *****
CEQ ** 2 * *

ERM * 22 *
NAM 2 3 *

TAN *2** *
HBV 2 2**

SRM 3 2*
SSA 2 2 2

PRM 2* ** *
DAY 2* * * *

VERIFICATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC * ***
CEQ * 2*

ERM 3 *
NAM * 2 *

TAN **2
HBV ** 2

SRM ****
SSA ** **

PRM * 2 *
DAY * ** *

SNOWMELT SEASON

CALIBRATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC ***3
CEQ ******

ERM * 2*2
NAM *22 *

TAN *3 * *
HBV *2* * *

SRM * 4*
SSA **3 *

PRM **2 **
DAY * * * * * *

VERIFICATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC * *2
CEQ * 2*

ERM * * * *
NAM * 2 *

TAN *2 *
HBV * * 2

SRM 22
SSA * ** *

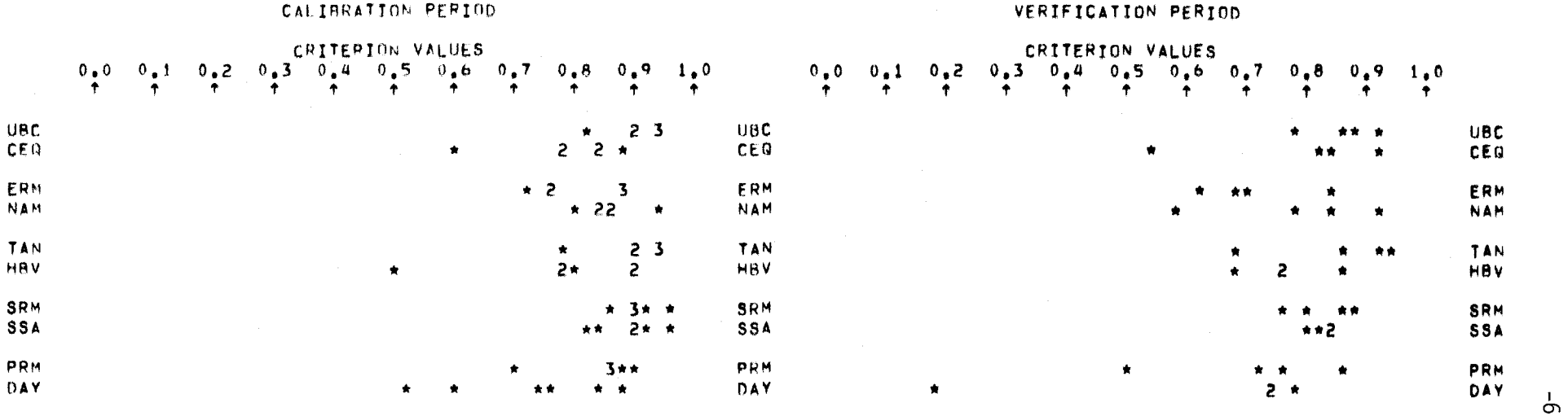
PRM * * * *
DAY 2* *

ANNUAL CRITERION VALUES

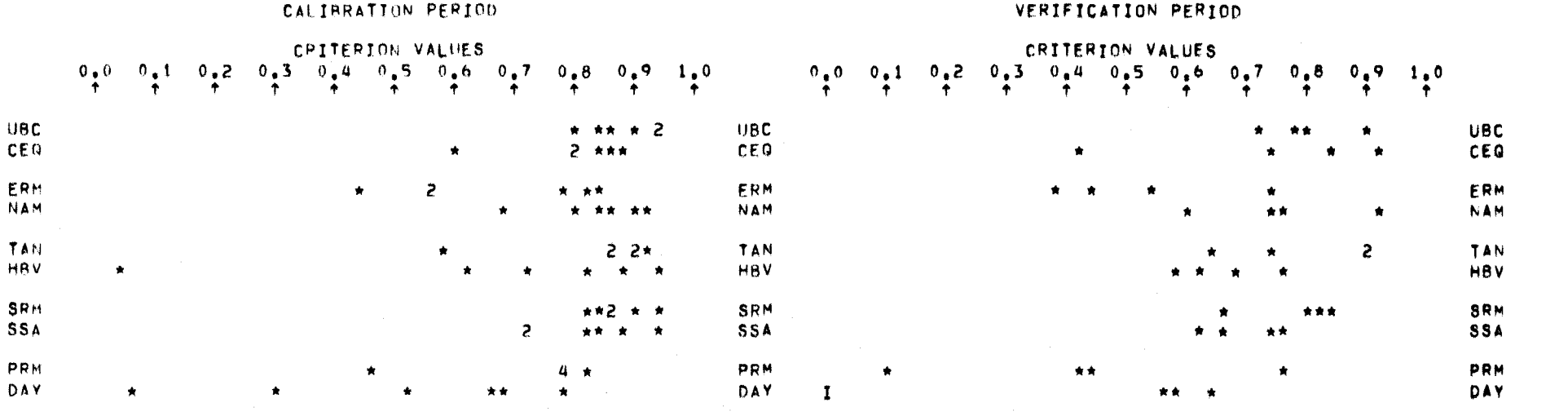
NTD

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR



SNOWMELT SEASON



ANNUAL CRITERION VALUES

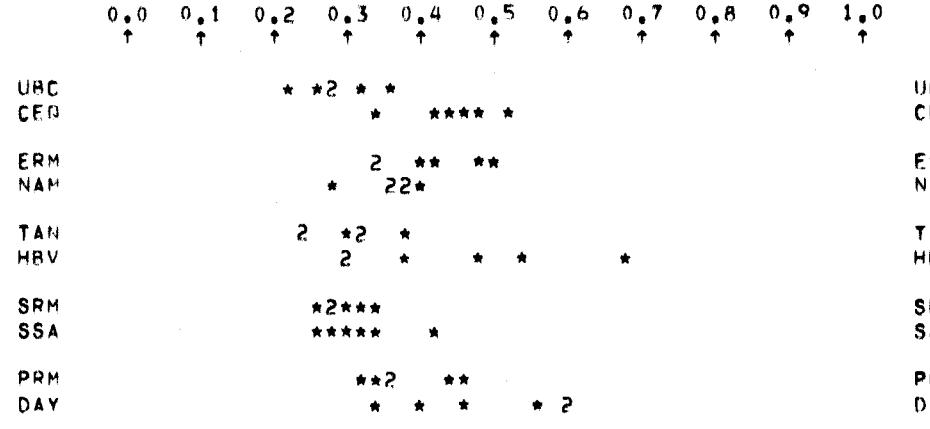
S

CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

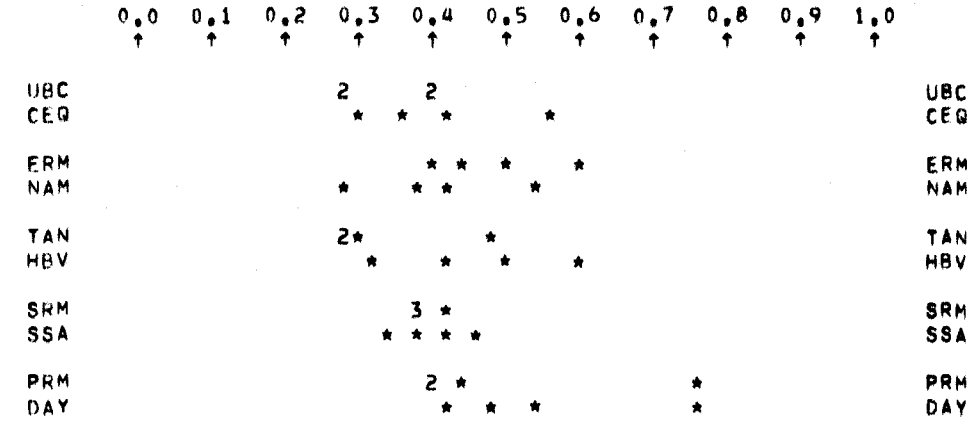
CALIBRATION PERIOD

CRITERION VALUES



VERIFICATION PERIOD

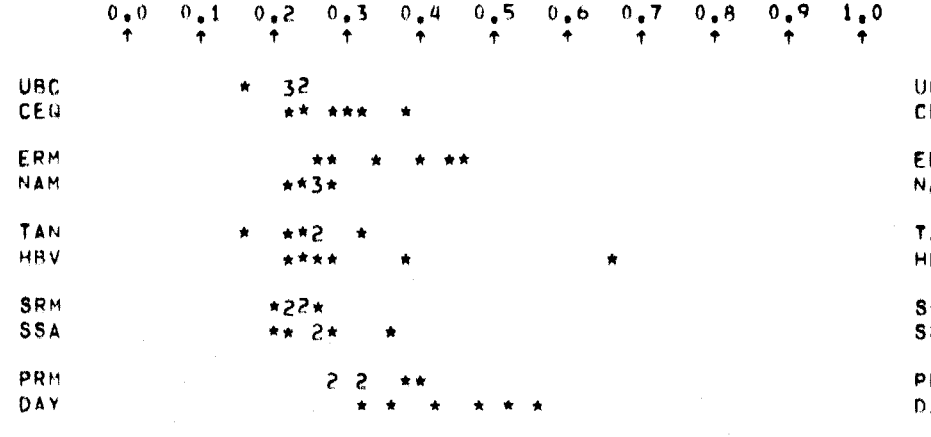
CRITERION VALUES



SNOWMELT SEASON

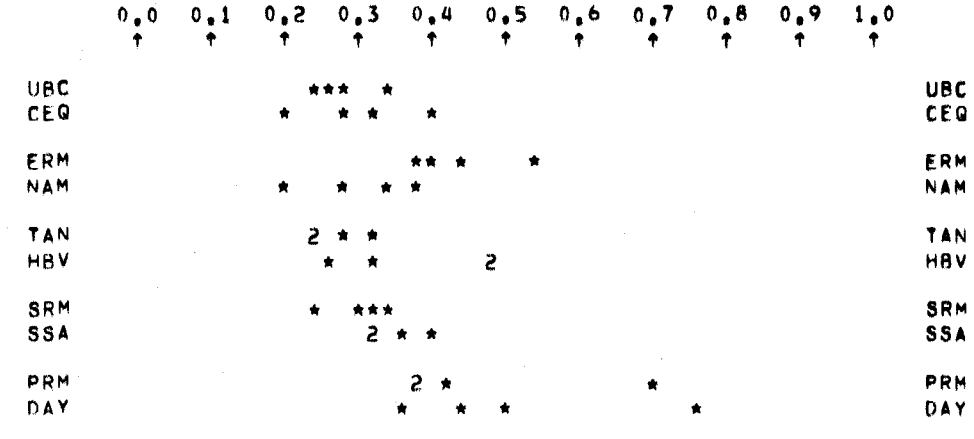
CALIBRATION PERIOD

CRITERION VALUES



VERIFICATION PERIOD

CRITERION VALUES



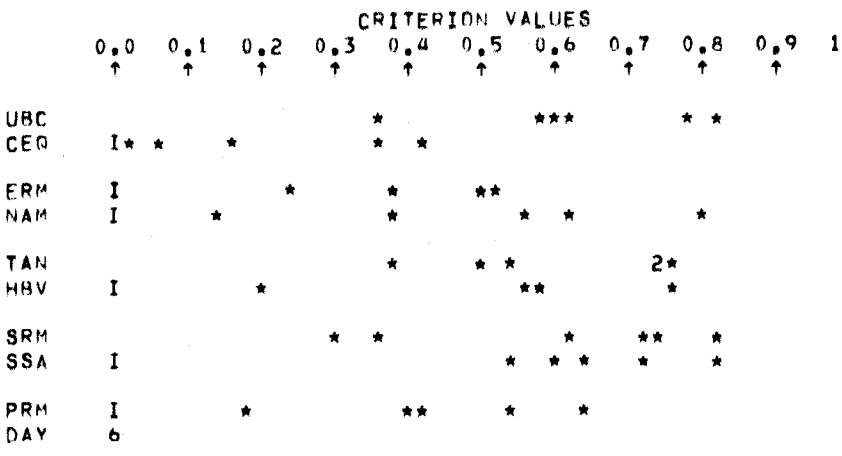
ANNUAL CRITERION VALUES

NS

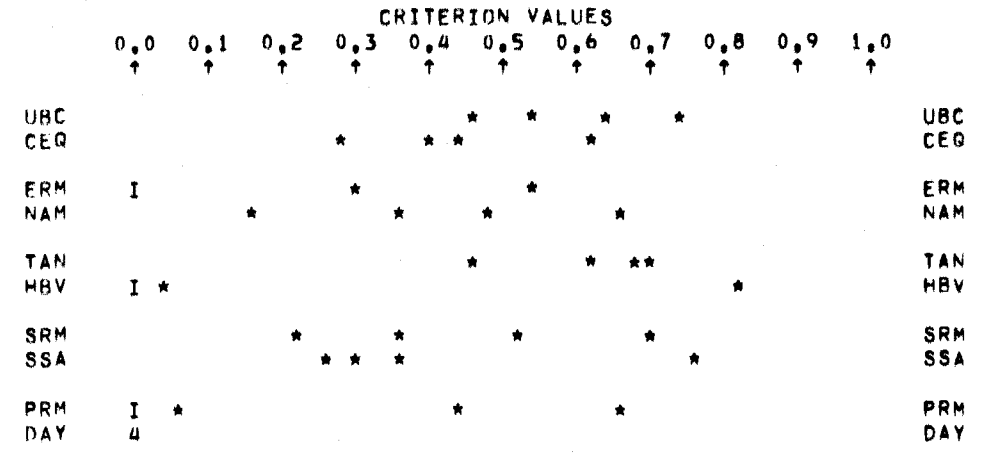
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

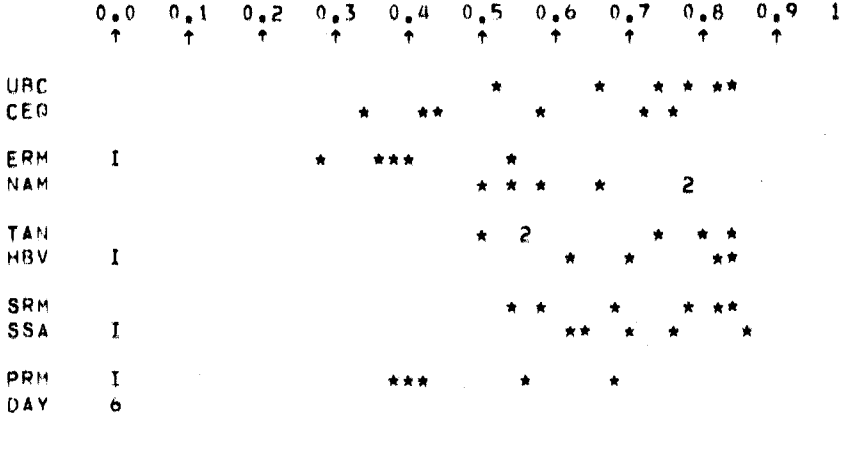


VERIFICATION PERIOD

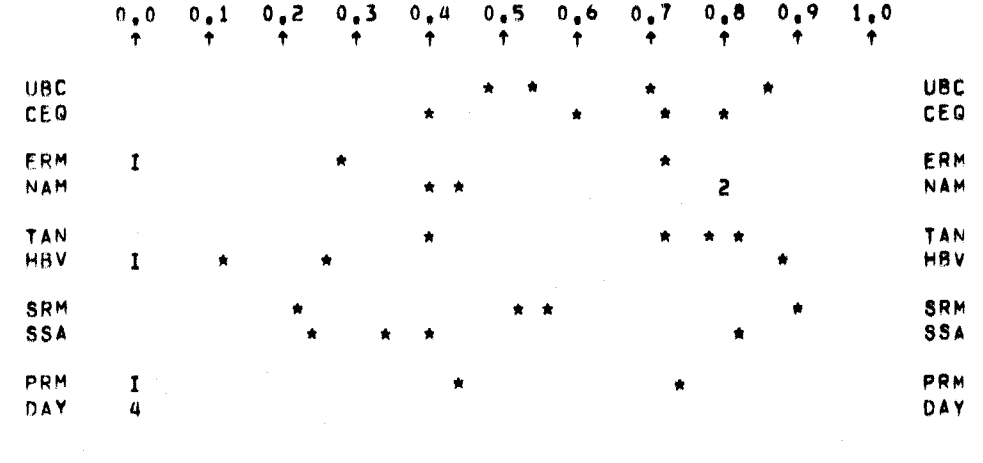


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD



ANNUAL CRITERION VALUES

R

CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

CRITERION VALUES

```
      -1.0 -0.8 -0.6 -0.4 -0.2  0.0  0.2  0.4  0.6  0.8  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑
UBC                          *22   *
CEQ                          * 23
ERM                          *    2 2  *
TAN                          **3*
HBV                          * 4*
SSA                           **4
DAY                          **** *  *
```

VERIFICATION PERIOD

CRITERION VALUES

```
      -1.0 -0.8 -0.6 -0.4 -0.2  0.0  0.2  0.4  0.6  0.8  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑
UBC                        2   2                              UBC
CEQ                         ****                              CEQ
ERM                          * *    *   *                     ERM
TAN                       *** *                               TAN
HBV                       *2 *                                HBV
SSA                       *2 *                                SSA
DAY                        * *     *  *                      DAY
```

SNOWMELT SEASON

CALIBRATION PERIOD

CRITERION VALUES

```
      -1.0 -0.8 -0.6 -0.4 -0.2  0.0  0.2  0.4  0.6  0.8  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑
UBC                          3**  *
CEQ                         * **2*
ERM                          *    2 **   *
TAN                         * 32
HBV                          * 3**
SSA                          **22
DAY                         *** 2     *
```

VERIFICATION PERIOD

CRITERION VALUES

```
      -1.0 -0.8 -0.6 -0.4 -0.2  0.0  0.2  0.4  0.6  0.8  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑
UBC                        * * **                             UBC
CEQ                         *2 *                              CEQ
ERM                          **    *   *                     ERM
TAN                       *2 *                                TAN
HBV                       *2 *                                HBV
SSA                       2**                                 SSA
DAY                        * *    *    *                     DAY
```

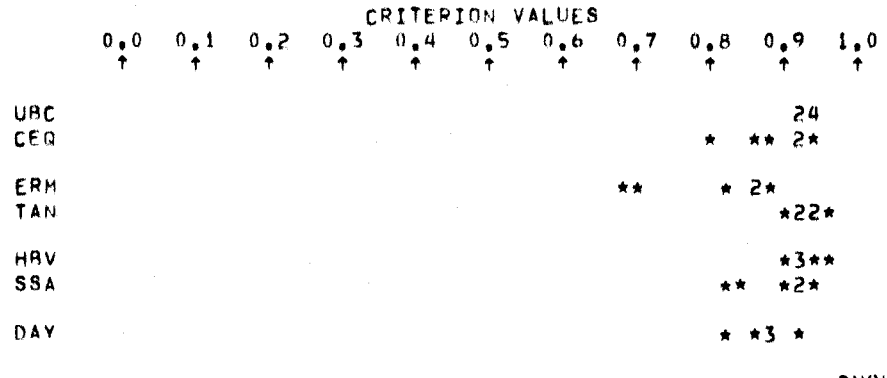
ANNUAL CRITERION VALUES

NTD

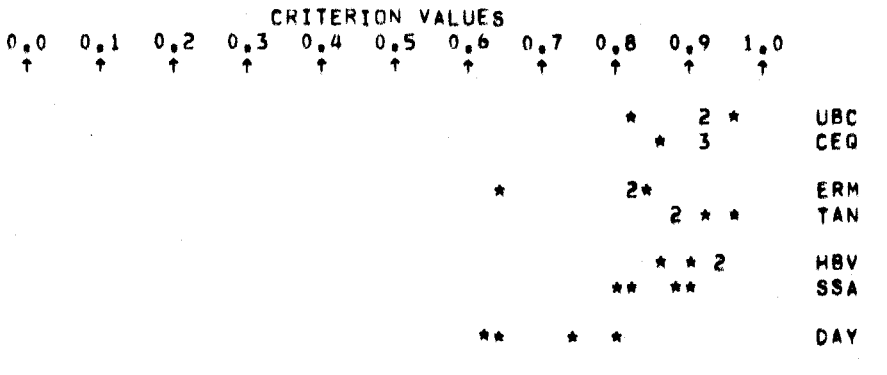
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

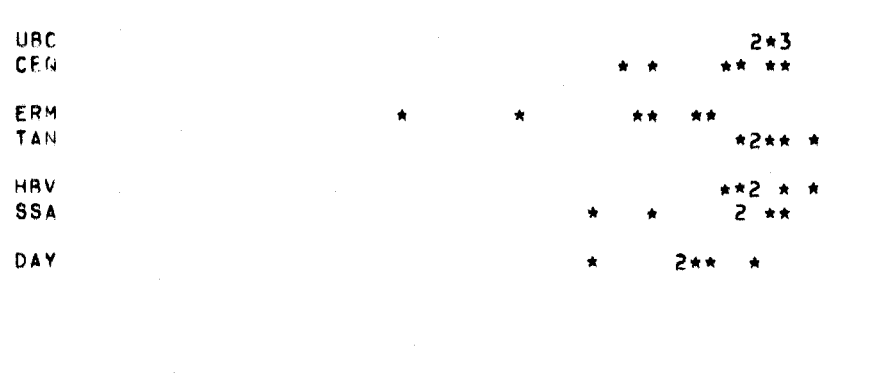


VERIFICATION PERIOD

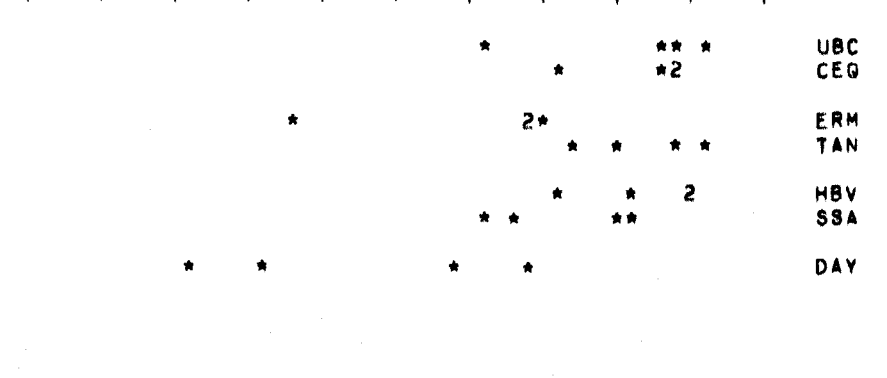


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD



ANNUAL CRITERION VALUES

S

CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

CRITERION VALUES

```
      0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8  0.9  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑

UBC                 **22
CEQ                  ***  **      *

ERM                       2*    *  **
TAN                * *2**

HBV                * 2 2   *
SSA                  *2 *     * *

DAY                      *2 ***
```

VERIFICATION PERIOD

CRITERION VALUES

```
      0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8  0.9  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑

UBC                  * * *   *                                UBC
CEQ                   * ***                                   CEQ

ERM                       *     **      *                      ERM
TAN                 *  * **                                   TAN

HBV                 *  *  2                                   HBV
SSA                       ***  *                              SSA

DAY                             * **   *                      DAY
```

SNOWMELT SEASON

CALIBRATION PERIOD

CRITERION VALUES

```
      0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8  0.9  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑

UBC              **4
CEQ               *** **    *

ERM                   *2   *   **
TAN             * *3 *

HBV             * 2** *
SSA               **2    **

DAY                  *2 *2
```

VERIFICATION PERIOD

CRITERION VALUES

```
      0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8  0.9  1.0
       ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑

UBC              * * *  *                                     UBC
CEQ                ****                                       CEQ

ERM                    *   **     *                            ERM
TAN              *  ***                                       TAN

HBV              * *  2                                       HBV
SSA                    2*  *                                  SSA

DAY                         * **  *                           DAY
```

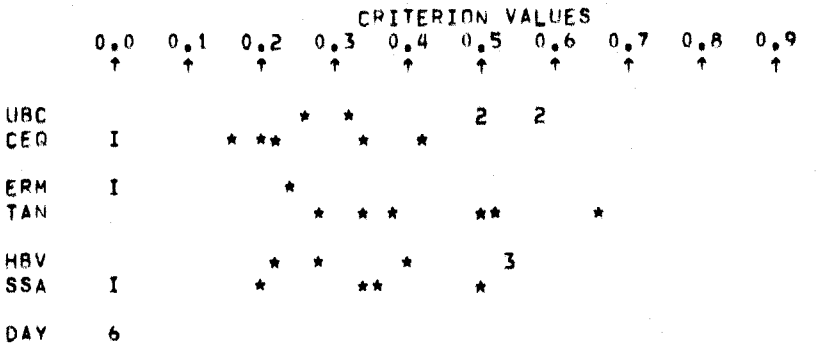
ANNUAL CRITERION VALUES

NS

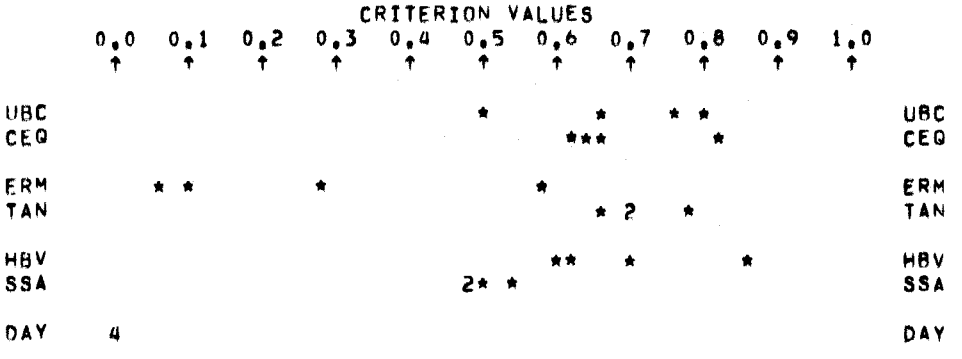
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

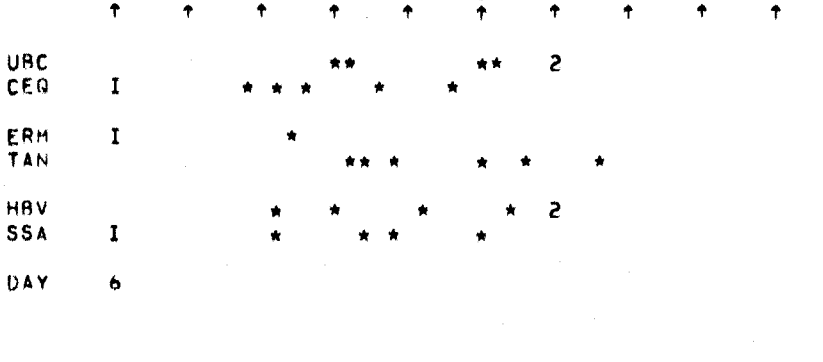


VERIFICATION PERIOD

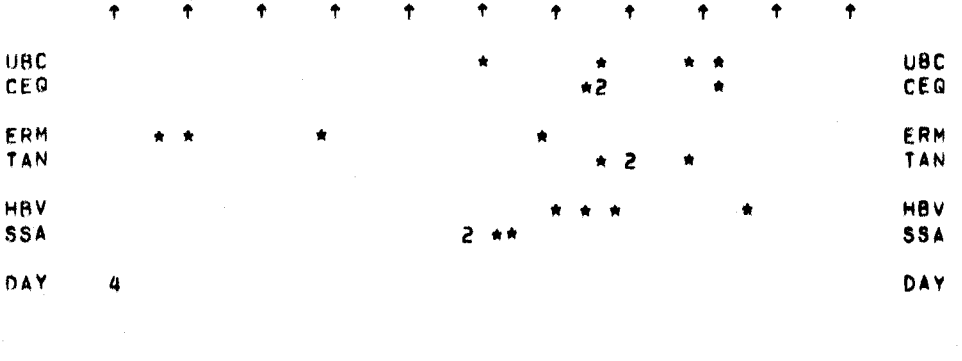


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD

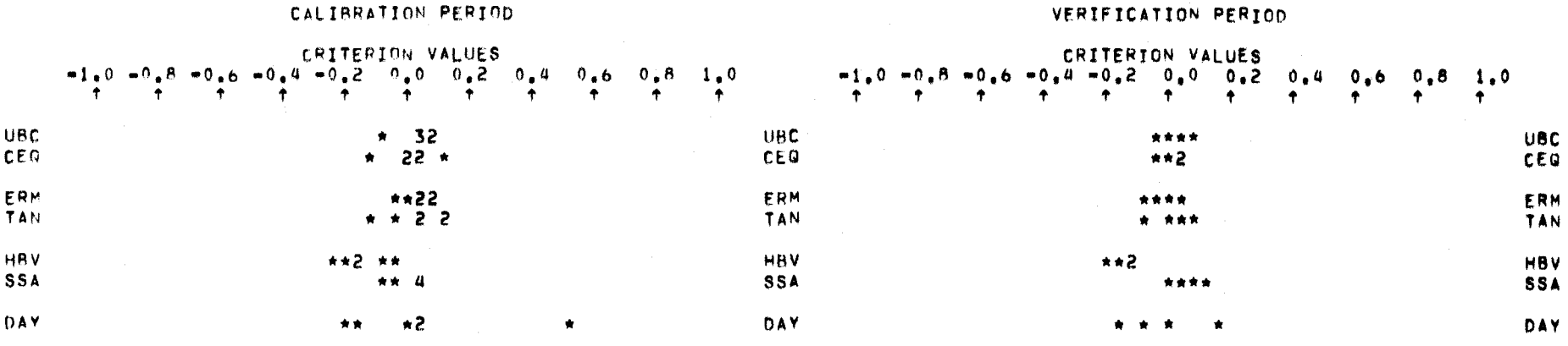


ANNUAL CRITERION VALUES

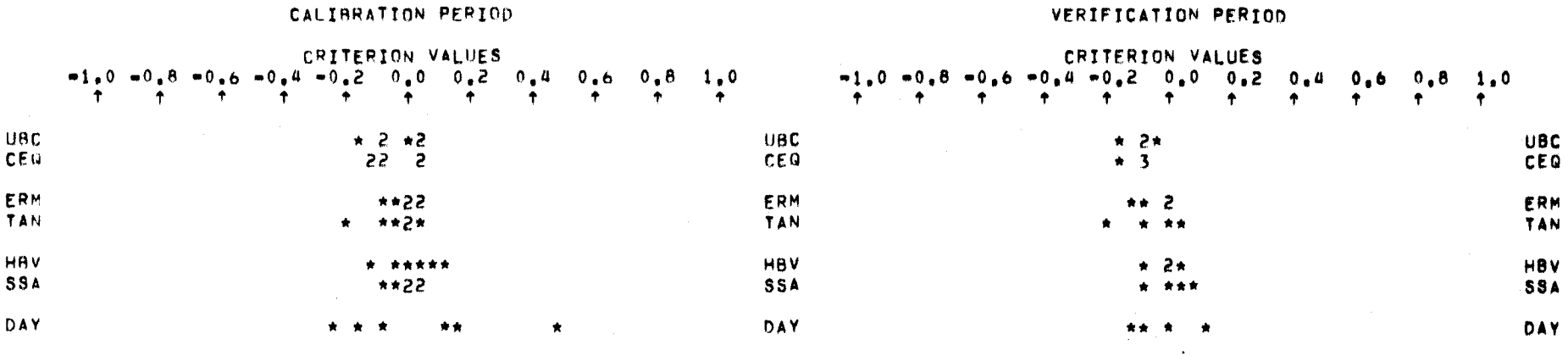
R

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR



SNOWMELT SEASON

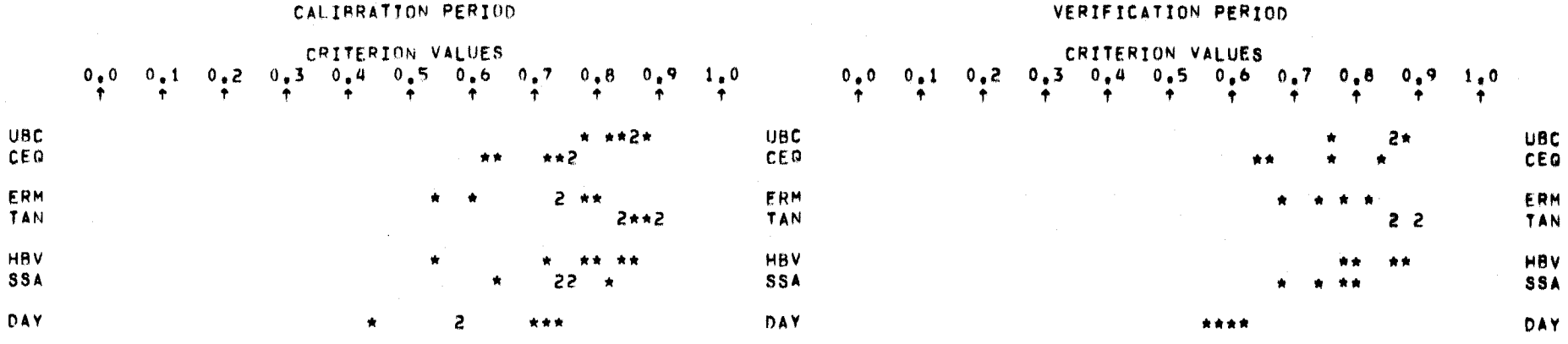


ANNUAL CRITERION VALUES

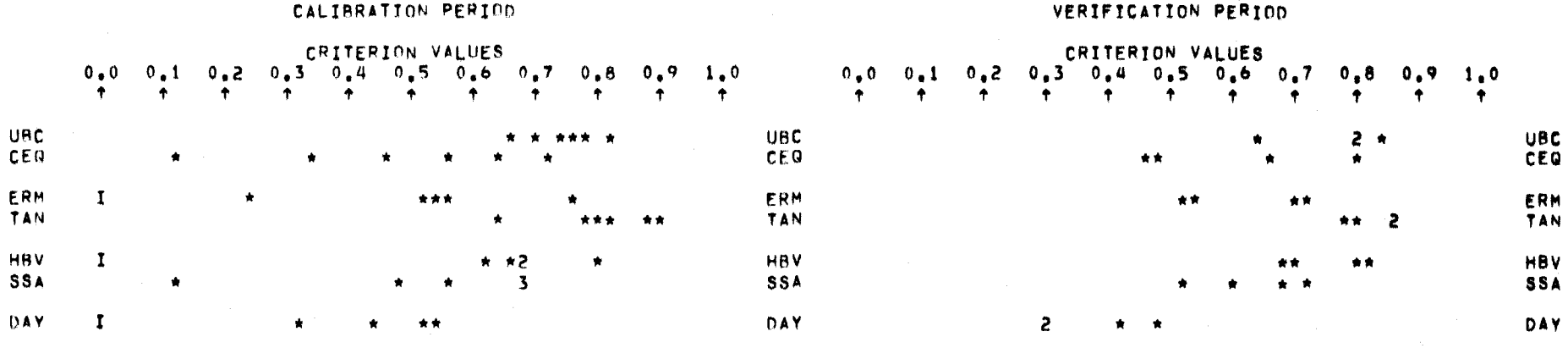
NTD

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR



SNOWMELT SEASON



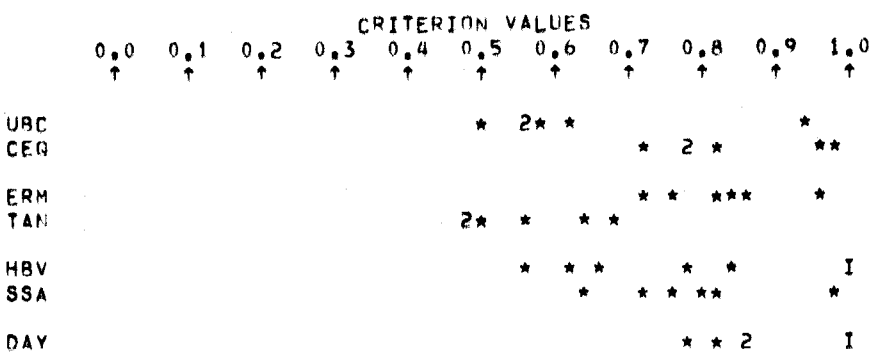
ANNUAL CRITERION VALUES

S

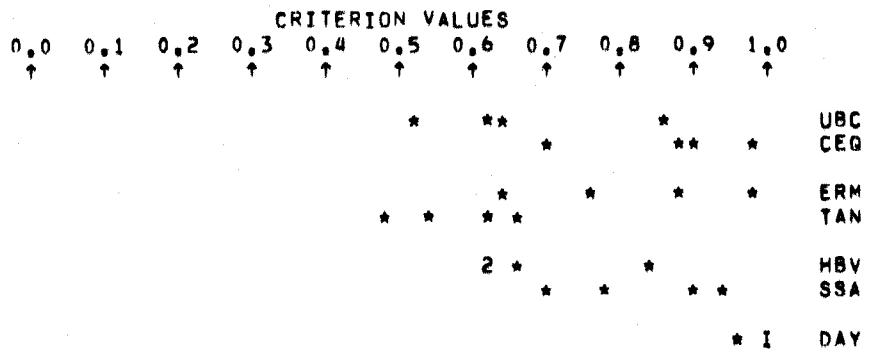
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

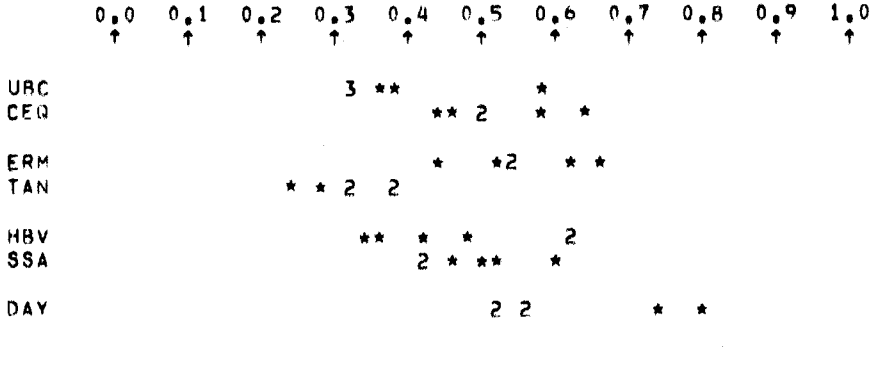


VERIFICATION PERIOD

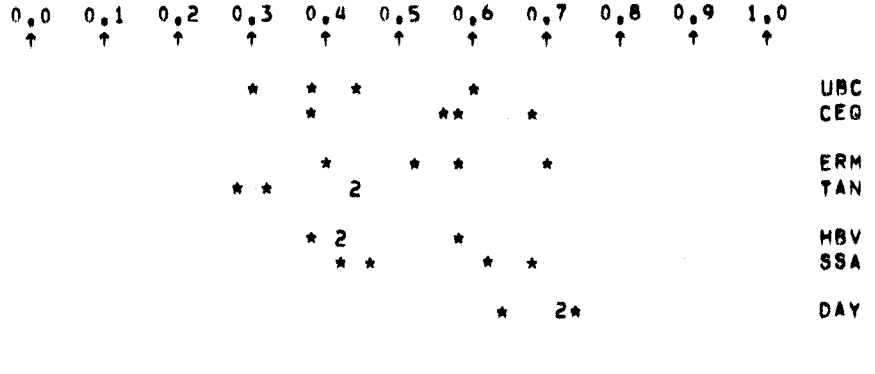


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD

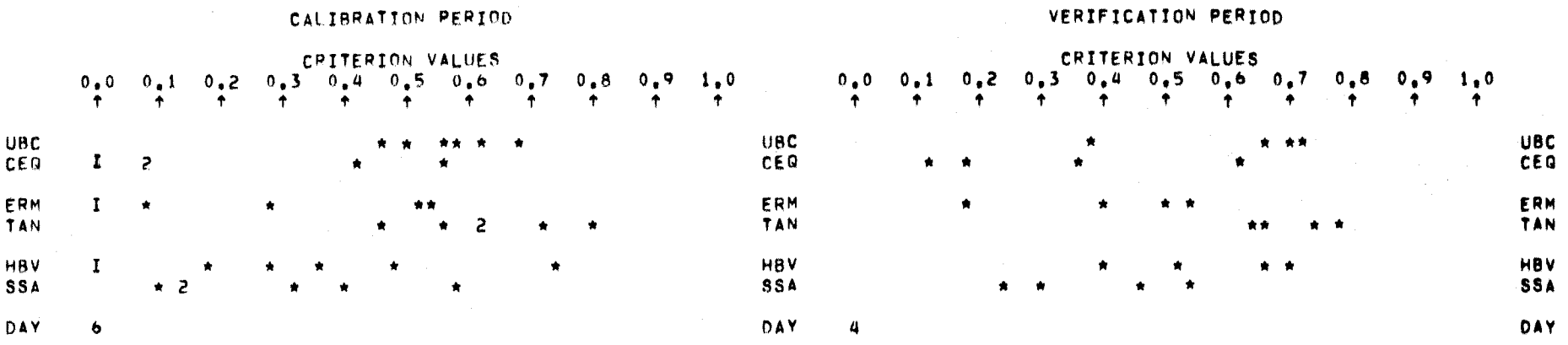


ANNUAL CRITERION VALUES

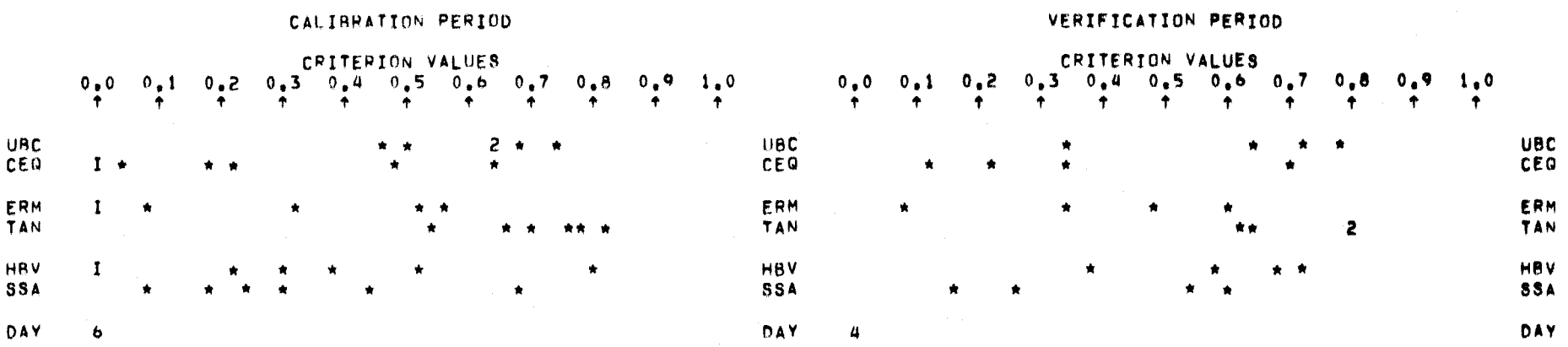
NS

CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR



SNOWMELT SEASON



APPENDIX C

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0351	.0318	.0425	.0240	.0347	.0324	-1.0000	.0325	.0271	.0212	.0528
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.087	-.071	-.056	-.004	-.112	-.082	-1.000	-.087	-.070	-.094	-.139
V_*	.003	.010	.053	.058	-.023	.001	-1.000	-.003	-.000	-.040	-.003
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.093	.092	.162	.120	.066	.084	-1.000	.080	.069	.014	.133

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0428	.0123	.1017	.0562	.0243	.0477	.0383	.0290	.0506	.0310	.1427
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.105	.026	-.492	-.012	-.114	-.119	-.119	-.078	-.080	-.066	-.692
V_*	.031	.065	-.168	.167	-.037	.033	.002	.014	.081	.032	-.238
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.167	.104	.155	.345	.041	.185	.124	.106	.242	.131	.216

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0433	.0349	.0666	.0240	.0400	.0523	-1.0000	.0391	.0502	.0338	.0675
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.119	-.103	-.048	-.057	-.142	-.128	-1.000	-.084	-.038	-.133	-.178
V_*	-.008	-.013	.123	.005	-.039	.006	-1.000	.016	.091	-.047	-.005
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.104	.077	.294	.066	.064	.141	-1.000	.117	.220	.040	.169

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0159	.0259	.1297	.0396	.0271	.0334	.0581	.0304	.0838	.0269	.1449
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.076	-.159	-.621	-.130	-.196	-.120	-.135	-.112	-.295	-.100	-.680
V_*	-.025	-.077	-.209	-.004	-.110	-.013	.050	-.016	-.028	-.015	-.220
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.025	.005	.204	.122	-.024	.093	.235	.081	.238	.070	.241

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0108	.0497	.0347	.0202	.0225	.0405	-1.0000	.0068	.0428	.0196	.0249
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.874	.718	.659	.847	.832	.753	-1.000	.882	.717	.858	.726
V_*	.901	.846	.748	.899	.890	.857	-1.000	.900	.827	.908	.790
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.929	.974	.837	.951	.947	.961	-1.000	.917	.937	.959	.854

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0370	.0181	.0550	.0181	.0344	.0316	.0250	.0289	.0627	.0075	.0671
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.754	.833	.514	.808	.782	.797	.788	.795	.558	.910	.355
V_*	.872	.891	.689	.865	.892	.897	.868	.887	.757	.934	.568
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.989	.948	.864	.923	1.001	.998	.947	.979	.957	.958	.781

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0212	.1042	.0656	.0346	.0321	.0921	-1.0000	.0229	.0880	.0358	.0568
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.798	.485	.528	.796	.746	.484	-1.000	.765	.481	.763	.451
V_*	.853	.753	.696	.885	.829	.721	-1.000	.824	.707	.855	.597
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.908	1.021	.865	.974	.911	.957	-1.000	.883	.933	.947	.743

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0345	.0174	.0818	.0218	.0646	.0277	.0552	.0685	.0372	.0160	.0911
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.734	.852	.267	.863	.651	.808	.714	.608	.645	.885	.117
V_*	.844	.907	.527	.932	.857	.896	.890	.826	.763	.936	.406
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.954	.962	.787	1.002	1.062	.984	1.065	1.044	.882	.987	.696

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0115	.0572	.0288	.0246	.0315	.0469	-1.0000	.0078	.0424	.0250	.0213
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.253	.209	.377	.223	.218	.222	-1.000	.264	.267	.209	.357
V_*	.282	.356	.451	.286	.299	.343	-1.000	.284	.376	.273	.412
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.312	.504	.525	.350	.380	.463	-1.000	.304	.485	.337	.466

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0521	.0371	.0680	.0322	.0481	.0404	.0330	.0469	.0639	.0302	.0486
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.195	.212	.340	.264	.180	.197	.259	.189	.292	.160	.503
V_*	.360	.330	.556	.366	.333	.325	.364	.338	.495	.256	.657
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.526	.448	.772	.469	.485	.454	.469	.487	.698	.352	.811

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0182	.0714	.0419	.0286	.0287	.0530	-1.0000	.0086	.0474	.0247	.0272
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.186	.123	.227	.134	.177	.188	-1.000	.233	.209	.169	.315
V_*	.233	.306	.334	.207	.251	.324	-1.000	.255	.331	.232	.385
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.279	.490	.442	.281	.325	.460	-1.000	.277	.453	.296	.455

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0438	.0470	.0911	.0451	.0799	.0084	.0674	.0783	.0519	.0401	.0611
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.155	.075	.219	.050	.033	.217	.040	.065	.196	.060	.380
V_*	.294	.225	.508	.194	.287	.244	.255	.314	.361	.187	.575
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.434	.374	.798	.337	.541	.271	.469	.563	.526	.315	.769

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0598	.1716	.1243	.0425	.0736	.1252	-1.0000	.0755	.1075	.0814	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.380	-.188	-.515	.406	.282	-.015	-1.000	.336	-.114	.356	0.000
V_*	.534	.253	-.196	.515	.472	.307	-1.000	.530	.162	.565	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.688	.694	.124	.624	.661	.629	-1.000	.724	.439	.774	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0561	.0238	.0953	.0519	.0559	.0738	.0792	.0637	.1101	.0281	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.522	.672	-.019	.528	.569	.530	.451	.537	.087	.761	0.000
V_*	.700	.747	.284	.693	.747	.765	.703	.740	.437	.850	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.879	.823	.587	.858	.925	.999	.955	.942	.788	.939	0.000

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0632	.2099	.1315	.0533	.0562	.1477	-1.0000	.0832	.1169	.0836	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.478	-.165	-.088	.574	.431	-.086	-1.000	.357	-.041	.428	0.000
V_*	.640	.375	.250	.711	.576	.294	-1.000	.571	.260	.643	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.803	.914	.588	.848	.720	.673	-1.000	.785	.560	.858	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0282	.0324	.1167	.0379	.0955	.0321	.0971	.1095	.0455	.0263	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.646	.742	-.161	.768	.456	.723	.515	.363	.460	.810	0.000
V_*	.736	.846	.210	.889	.760	.825	.823	.711	.604	.894	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.826	.949	.582	1.009	1.063	.927	1.132	1.060	.749	.978	0.000

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0162	.0196	=1.0000	.0230	.0141	.0183	.0227	.0140	.0256	.0126	.0860
$V_* - t_{(.975,d)}\hat{\sigma}_*$	=.036	=.052	=1.000	.062	=.030	.003	=.150	=.034	=.103	=.034	=.228
V_*	.006	=.002	=1.000	.121	.006	.050	=.092	.002	=.037	=.002	=.007
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.047	.048	=1.000	.180	.042	.097	=.034	.038	.029	.031	.214

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0381	.0368	=1.0000	.0230	.0296	.0443	.0489	.0315	.0200	.0152	.0915
$V_* - t_{(.975,d)}\hat{\sigma}_*$	=.093	=.094	=1.000	=.006	=.128	=.061	=.338	=.108	=.088	=.032	=.290
V_*	.028	.023	=1.000	.067	=.034	.080	=.182	=.008	=.024	.016	.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.149	.140	=1.000	.141	.060	.221	=.027	.092	.040	.064	.291

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0244	.0284	=1.0000	.0297	.0177	.0240	.0261	.0170	.0149	.0276	.0673
$V_* - t_{(.975,d)}\hat{\sigma}_*$	=.112	=.059	=1.000	=.140	=.046	=.072	=.107	=.063	=.131	=.075	=.177
V_*	=.049	.014	=1.000	=.064	=.000	=.011	=.039	=.019	=.093	=.004	=.004
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.014	.087	=1.000	.013	.045	.051	.028	.025	=.055	.067	.168

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0736	.0521	=1.0000	.0597	.0526	.0666	.0488	.0637	.0316	.0511	.1195
$V_* - t_{(.975,d)}\hat{\sigma}_*$	=.241	=.137	=1.000	=.308	=.195	=.240	=.245	=.173	=.150	=.154	=.273
V_*	=.007	.029	=1.000	=.118	=.028	=.028	=.089	.030	=.050	.009	.107
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.227	.195	=1.000	.072	.139	.184	.066	.232	.050	.171	.487

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0138	.0511	-1.0000	.0234	.0197	.0213	.0314	.0266	.0148	.0111	.0825
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.843	.600	-1.000	.764	.870	.812	.733	.798	.800	.905	.341
V_*	.878	.731	-1.000	.824	.920	.867	.813	.867	.838	.933	.553
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.913	.862	-1.000	.884	.971	.922	.894	.935	.876	.962	.765

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0247	.1209	-1.0000	.0295	.0442	.0475	.0519	.0459	.0081	.0080	.1248
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.688	.234	-1.000	.683	.672	.593	.546	.627	.773	.877	-.243
V_*	.767	.619	-1.000	.776	.812	.744	.711	.773	.799	.902	.154
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.845	1.003	-1.000	.870	.953	.895	.876	.919	.824	.928	.551

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0217	.0518	-1.0000	.0466	.0471	.0459	.0272	.0516	.0245	.0247	.0828
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.836	.639	-1.000	.721	.766	.732	.771	.704	.732	.848	.336
V_*	.892	.773	-1.000	.841	.887	.850	.840	.837	.795	.911	.549
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.948	.906	-1.000	.961	1.008	.968	.910	.970	.858	.975	.762

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0331	.2016	-1.0000	.0546	.0949	.0433	.0399	.0519	.0308	.0175	.2772
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.678	-.086	-1.000	.616	.428	.645	.687	.535	.726	.817	-.840
V_*	.783	.555	-1.000	.789	.730	.782	.813	.700	.824	.873	.041
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.888	1.196	-1.000	.963	1.032	.920	.940	.865	.922	.929	.923

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0247	.0481	=1.0000	.0434	.0346	.0463	.0281	.0523	.0436	.0204	.0814
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.415	.591	=1.000	.463	.303	.381	.522	.367	.438	.302	.710
V_*	.478	.714	=1.000	.574	.391	.500	.594	.502	.550	.355	.919
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.542	.838	=1.000	.686	.480	.619	.667	.636	.662	.407	1.128

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0263	.1096	=1.0000	.0450	.0654	.0506	.0497	.0540	.0133	.0214	.0698
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.466	.363	=1.000	.394	.287	.416	.455	.372	.467	.287	.825
V_*	.549	.711	=1.000	.537	.495	.577	.613	.544	.509	.355	1.047
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.633	1.060	=1.000	.680	.703	.738	.771	.716	.552	.423	1.269

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0139	.0380	=1.0000	.0532	.0521	.0404	.0235	.0507	.0261	.0172	.0532
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.276	.354	=1.000	.242	.193	.266	.317	.255	.359	.240	.498
V_*	.312	.452	=1.000	.379	.327	.370	.377	.385	.426	.284	.634
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.347	.550	=1.000	.516	.461	.474	.438	.516	.493	.329	.771

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0187	.1573	=1.0000	.0455	.0743	.0486	.0437	.0575	.0176	.0157	.0870
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.351	.098	=1.000	.263	.229	.255	.241	.297	.314	.263	.594
V_*	.410	.598	=1.000	.407	.465	.410	.380	.480	.370	.313	.871
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.470	1.098	=1.000	.552	.701	.564	.519	.663	.426	.363	1.148

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0575	.0842	-1.0000	.0780	.0589	.0571	.0410	.0895	.1098	.0375	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.589	.187	-1.000	.418	.677	.563	.481	.486	.375	.760	0.000
V_*	.736	.404	-1.000	.619	.829	.709	.586	.715	.657	.856	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.884	.620	-1.000	.819	.980	.856	.692	.945	.939	.953	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0570	.1807	-1.0000	.0416	.0581	.0835	.0886	.0838	.0269	.0198	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.550	-.004	-1.000	.608	.597	.442	.387	.476	.680	.824	0.000
V_*	.732	.570	-1.000	.740	.782	.707	.669	.743	.766	.887	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.913	1.145	-1.000	.872	.966	.973	.951	1.009	.851	.950	0.000

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0421	.1367	-1.0000	.1169	.0952	.0866	.0657	.1146	.0796	.0487	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.655	.160	-1.000	.360	.507	.447	.485	.353	.353	.680	0.000
V_*	.763	.512	-1.000	.660	.752	.670	.653	.647	.557	.806	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.872	.863	-1.000	.961	.997	.893	.822	.942	.762	.931	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0466	.3090	-1.0000	.0572	.0906	.0917	.0714	.1382	.0299	.0280	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.637	-.363	-1.000	.606	.436	.506	.594	.286	.729	.785	0.000
V_*	.786	.620	-1.000	.787	.724	.797	.821	.725	.824	.875	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.934	1.603	-1.000	.969	1.012	1.089	1.048	1.165	.919	.964	0.000

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	,0467	,0221	,0430	,0658	,0353	,0243	-1,0000	,0155	,0266	,0265	,0720
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,145	-,040	-,147	-,141	-,063	-,042	-1,000	-,037	-,074	-,064	-,190
V_*	-,025	,017	-,037	,028	,028	,021	-1,000	,003	-,006	,004	-,005
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,095	,074	,074	,197	,118	,083	-1,000	,042	,062	,072	,180

VERIFICATION PERIOD

$\hat{\sigma}_*$	,0491	,0510	,0369	,0500	,0290	,0621	-1,0000	,0613	,0448	,0637	,0621
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,240	-,183	-,142	,008	-,051	-,173	-1,000	-,170	-,140	-,209	-,172
V_*	-,084	-,021	-,024	,168	,041	,024	-1,000	,025	,003	-,006	,026
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,072	,141	,093	,327	,133	,222	-1,000	,220	,145	,196	,223

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	,0592	,0639	,0882	,1301	,0745	,0463	-1,0000	,0439	,0551	,0567	,0989
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,179	-,200	-,281	-,223	-,092	-,112	-1,000	-,240	-,221	-,114	-,264
V_*	-,027	-,036	-,055	,112	,100	,007	-1,000	-,128	-,079	,032	-,010
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,125	,128	,172	,446	,291	,126	-1,000	-,015	,062	,177	,245

VERIFICATION PERIOD

$\hat{\sigma}_*$	,0388	,0441	,0442	,0873	,0254	,0476	-1,0000	,0122	,0302	,0281	,1220
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,191	-,257	-,173	-,103	-,007	-,165	-1,000	-,190	-,222	-,026	-,522
V_*	-,067	-,116	-,033	,174	,074	-,014	-1,000	-,151	-,126	,064	-,135
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,056	,024	,108	,452	,155	,137	-1,000	-,113	-,030	,153	,253

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0721	.0958	.0597	.0913	.0418	.0492	-1.0000	.1109	.0538	.0347	.0542
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.587	.446	.572	.397	.739	.695	-1.000	.283	.714	.794	.110
V_*	.772	.692	.725	.631	.846	.822	-1.000	.568	.852	.883	.249
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.958	.938	.879	.866	.954	.948	-1.000	.854	.990	.972	.388

VERIFICATION PERIOD

$\hat{\sigma}_*$	.1920	.0900	.3339	.0791	.0831	.0384	-1.0000	.0415	.0956	.0782	.1247
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.184	.480	-.456	.448	.565	.630	-1.000	.416	.535	.599	-.311
V_*	.794	.766	.605	.700	.829	.753	-1.000	.548	.839	.847	.086
$V_* + t_{(.975,d)}\hat{\sigma}_*$	1.405	1.052	1.667	.951	1.093	.875	-1.000	.680	1.143	1.096	.483

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0655	.0416	.2052	.5197	.1673	.0765	-1.0000	.0450	.0516	.1276	.0813
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.438	.516	-.004	-1.382	.181	.458	-1.000	.480	.489	.475	.161
V_*	.606	.623	.524	-.047	.611	.654	-1.000	.596	.621	.803	.370
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.774	.730	1.051	1.289	1.041	.851	-1.000	.712	.754	1.131	.579

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0590	.0948	1.0454	.1852	.0223	.0608	-1.0000	.0296	.0357	.0929	.1530
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.438	.342	-3.615	-.157	.701	.526	-1.000	.522	.612	.475	-.420
V_*	.626	.643	-.291	.432	.772	.720	-1.000	.617	.725	.771	.066
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.814	.944	3.033	1.021	.843	.913	-1.000	.711	.839	1.066	.553

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0659	.1208	.0614	.1095	.0437	.0388	-1.0000	.1702	.0472	.0227	.1634
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.461	.416	.529	.513	.404	.458	-1.000	.413	.391	.395	.697
V_*	.631	.726	.687	.795	.516	.558	-1.000	.850	.513	.454	1.117
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.800	1.037	.844	1.076	.629	.657	-1.000	1.288	.634	.512	1.536

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0330	.0720	.0959	.0930	.0439	.0992	-1.0000	.1792	.0318	.0355	.2027
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.526	.389	.561	.392	.398	.299	-1.000	.244	.430	.396	.532
V_*	.631	.618	.867	.688	.537	.615	-1.000	.814	.531	.509	1.177
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.735	.847	1.172	.983	.677	.930	-1.000	1.384	.632	.622	1.822

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0579	.0579	.0384	.3342	.0485	.0762	-1.0000	.0737	.0329	.0483	.0730
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.408	.394	.534	.061	.447	.326	-1.000	.370	.463	.294	.515
V_*	.557	.542	.632	.920	.572	.522	-1.000	.560	.547	.418	.703
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.706	.691	.731	1.779	.696	.718	-1.000	.749	.632	.542	.890

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0906	.0150	.2348	.0731	.0429	.0201	-1.0000	.0548	.0319	.0223	.0510
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.184	.428	.250	.367	.236	.355	-1.000	.308	.309	.316	.598
V_*	.472	.476	.996	.600	.372	.419	-1.000	.482	.411	.387	.760
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.760	.524	1.743	.832	.508	.483	-1.000	.656	.512	.458	.922

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0758	.1357	.0774	.1093	.0422	.0531	-1.0000	.1660	.0588	.0425	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.498	.246	.436	.227	.685	.624	-1.000	.008	.649	.734	0.000
V_*	.693	.595	.635	.508	.793	.760	-1.000	.435	.800	.844	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.888	.944	.834	.789	.902	.897	-1.000	.861	.951	.953	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.1531	.0576	.2621	.0370	.0566	.0213	-1.0000	.0611	.0700	.0560	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.268	.553	-.305	.548	.625	.662	-1.000	.319	.591	.648	0.000
V_*	.755	.736	.529	.666	.805	.729	-1.000	.514	.814	.826	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	1.242	.919	1.362	.784	.985	.797	-1.000	.708	1.037	1.004	0.000

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.1089	.0731	.2417	.8295	.1968	.0956	-1.0000	.0972	.0833	.1559	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.101	.221	-.391	-2.707	-.135	.206	-1.000	.119	.190	.275	0.000
V_*	.381	.408	.230	-.575	.371	.451	-1.000	.369	.404	.676	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.661	.596	.851	1.557	.876	.697	-1.000	.618	.618	1.076	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.1015	.0439	.9114	.1663	.0265	.0380	-1.0000	.0423	.0213	.0700	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.291	.472	-3.408	-.136	.675	.578	-1.000	.462	.640	.526	0.000
V_*	.613	.612	-.509	.393	.759	.699	-1.000	.596	.708	.749	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.936	.751	2.389	.922	.844	.820	-1.000	.730	.776	.972	0.000

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	,0305	,0393	,0244	,0469	,0364	,0276	,0203	,0256	,0307	=1,0000	,0819
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,089	-,097	-,122	-,175	-,083	-,026	-,091	-,058	-,061	=1,000	-,217
V_*	-,010	,003	-,059	-,054	,011	,045	-,038	,007	,018	=1,000	-,007
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,068	,104	,004	,066	,104	,116	,014	,073	,097	=1,000	,204

VERIFICATION PERIOD

$\hat{\sigma}_*$	,0293	,0281	,0381	,0410	,0203	,0306	,0255	,0389	,0368	=1,0000	,0758
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,161	-,137	-,250	-,203	-,093	-,089	-,146	-,158	-,120	=1,000	-,241
V_*	-,067	-,047	-,129	-,073	-,029	,009	-,064	-,034	-,003	=1,000	,000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,026	,042	-,008	,057	,036	,106	,017	,090	,114	=1,000	,241

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	,0186	,0246	,0388	,0269	,0327	,0467	,0176	,0379	,0318	=1,0000	,0920
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,128	-,084	-,203	-,148	-,089	-,120	-,049	-,076	-,110	=1,000	-,245
V_*	-,080	-,021	-,103	-,078	-,005	-,000	-,003	,021	-,028	=1,000	-,008
$V_* + t_{(.975,d)}\hat{\sigma}_*$	-,032	,043	-,003	-,009	,079	,120	,042	,118	,054	=1,000	,228

VERIFICATION PERIOD

$\hat{\sigma}_*$	,0457	,0278	,0851	,0683	,0229	,0622	,0072	,0867	,0789	=1,0000	,0993
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-,256	-,132	-,471	-,293	-,113	-,237	-,006	-,299	-,294	=1,000	-,258
V_*	-,111	-,043	-,200	-,075	-,040	-,039	,017	-,024	-,043	=1,000	,058
$V_* + t_{(.975,d)}\hat{\sigma}_*$	,034	,045	,071	,142	,032	,159	,040	,252	,208	=1,000	,374

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0147	.0222	.0232	.0303	.0136	.0581	.0166	.0280	.0125	=1.0000	.0361
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.887	.767	.792	.810	.883	.617	.879	.839	.829	=1.000	.685
V_*	.925	.824	.852	.887	.918	.766	.921	.911	.861	=1.000	.778
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.963	.881	.911	.965	.953	.916	.964	.983	.893	=1.000	.870

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0213	.0478	.0496	.0484	.0325	.0343	.0208	.0073	.1050	=1.0000	.0687
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.815	.685	.590	.680	.788	.638	.780	.809	.369	=1.000	.493
V_*	.883	.837	.747	.834	.891	.747	.846	.832	.702	=1.000	.711
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.951	.989	.905	.988	.995	.856	.912	.856	1.036	=1.000	.929

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0213	.0173	.0463	.0251	.0188	.1645	.0208	.0485	.0202	=1.0000	.0480
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.855	.784	.651	.823	.842	.305	.854	.755	.744	=1.000	.534
V_*	.909	.828	.770	.887	.890	.728	.908	.880	.795	=1.000	.658
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.964	.873	.889	.952	.938	1.151	.962	1.004	.847	=1.000	.781

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0316	.0500	.0846	.0563	.0368	.0414	.0322	.0174	.2137	=1.0000	.1041
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.736	.681	.336	.642	.755	.516	.706	.693	=.197	=1.000	.210
V_*	.836	.840	.605	.821	.872	.648	.809	.748	.482	=1.000	.541
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.936	.999	.874	1.000	.989	.780	.911	.803	1.162	=1.000	.872

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0201	.0280	.0275	.0219	.0204	.0598	.0173	.0323	.0286	=1.0000	.0552
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.242	.375	.341	.305	.253	.366	.256	.240	.323	=1.000	.360
V_*	.294	.447	.411	.362	.305	.519	.301	.323	.396	=1.000	.502
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.345	.519	.482	.418	.358	.673	.345	.406	.470	=1.000	.643

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0315	.0480	.0459	.0435	.0369	.0536	.0088	.0283	.1093	=1.0000	.0636
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.235	.247	.348	.265	.210	.321	.358	.310	.192	=1.000	.327
V_*	.336	.400	.494	.403	.327	.491	.385	.400	.540	=1.000	.530
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.436	.552	.640	.542	.445	.662	.413	.490	.888	=1.000	.732

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0164	.0330	.0371	.0107	.0176	.0959	.0084	.0325	.0298	=1.0000	.0439
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.187	.226	.267	.228	.206	.168	.209	.184	.263	=1.000	.327
V_*	.229	.310	.363	.255	.251	.415	.231	.268	.340	=1.000	.440
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.271	.395	.458	.283	.296	.661	.252	.351	.416	=1.000	.553

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0289	.0353	.0417	.0448	.0175	.0498	.0088	.0201	.1074	=1.0000	.0654
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.202	.181	.324	.166	.208	.269	.290	.299	.189	=1.000	.284
V_*	.294	.293	.457	.309	.263	.427	.318	.363	.530	=1.000	.492
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.386	.405	.589	.451	.319	.585	.346	.427	.872	=1.000	.700

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0842	.1023	.1143	.1819	.0743	.3597	.1067	.1536	.0687	=1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.453	=.043	.049	.046	.449	=.927	.384	.220	.207	=1.000	0.000
V_*	.670	.220	.343	.514	.640	=.003	.659	.615	.383	=1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.886	.483	.636	.981	.831	.922	.933	1.010	.560	=1.000	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0673	.0607	.2052	.0870	.0472	.2969	.1098	.1391	.4484	=1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.392	.240	=.493	.151	.471	=.756	.140	.009	=1.375	=1.000	0.000
V_*	.607	.433	.159	.428	.621	.189	.489	.452	.051	=1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.821	.626	.812	.705	.771	1.133	.838	.894	1.476	=1.000	0.000

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0583	.0693	.0824	.0648	.0494	.4818	.0599	.1352	.0625	=1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.588	.328	.115	.506	.554	=.999	.580	.307	.248	=1.000	0.000
V_*	.738	.506	.327	.673	.680	.239	.734	.654	.409	=1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.887	.685	.538	.839	.807	1.477	.888	1.001	.569	=1.000	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0911	.0668	.2451	.1128	.0704	.2513	.1255	.1349	.5249	=1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.368	.441	=.600	.263	.502	=.510	.207	.051	=1.713	=1.000	0.000
V_*	.658	.653	.179	.622	.726	.289	.606	.479	=.044	=1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.948	.866	.958	.980	.950	1.088	1.006	.908	1.625	=1.000	0.000

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	FRM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0372	.0193	.0621	-1.0000	.0134	.0154	-1.0000	.0123	-1.0000	-1.0000	.0448
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.100	-.042	-.066	-1.000	-.047	-.044	-1.000	-.018	-1.000	-1.000	-.117
V_*	-.004	.008	.093	-1.000	-.012	-.004	-1.000	.014	-1.000	-1.000	-.002
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.091	.057	.253	-1.000	.022	.035	-1.000	.046	-1.000	-1.000	.113

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0478	.0269	.0910	-1.0000	.0337	.0247	-1.0000	.0292	-1.0000	-1.0000	.1019
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.207	-.112	-.155	-1.000	-.205	-.154	-1.000	-.176	-1.000	-1.000	-.299
V_*	-.055	-.026	.135	-1.000	-.098	-.075	-1.000	-.084	-1.000	-1.000	.025
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.097	.059	.424	-1.000	.009	.003	-1.000	.009	-1.000	-1.000	.349

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0362	.0248	.0722	-1.0000	.0135	.0163	-1.0000	.0178	-1.0000	-1.0000	.0523
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.122	-.051	-.077	-1.000	-.057	-.033	-1.000	-.044	-1.000	-1.000	-.137
V_*	-.029	.013	.108	-1.000	-.022	.009	-1.000	.002	-1.000	-1.000	-.003
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.064	.076	.294	-1.000	.012	.051	-1.000	.048	-1.000	-1.000	.132

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0482	.0173	.0958	-1.0000	.0290	.0204	-1.0000	.0228	-1.0000	-1.0000	.0979
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.254	-.084	-.162	-1.000	-.207	-.131	-1.000	-.169	-1.000	-1.000	-.297
V_*	-.101	-.029	.143	-1.000	-.115	-.066	-1.000	-.097	-1.000	-1.000	.015
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.052	.026	.447	-1.000	-.023	-.001	-1.000	-.024	-1.000	-1.000	.326

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	FRM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0026	.0263	.0290	-1.0000	.0077	.0115	-1.0000	.0228	-1.0000	-1.0000	.0121
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.926	.816	.745	-1.000	.914	.895	-1.000	.831	-1.000	-1.000	.844
V_*	.932	.884	.820	-1.000	.933	.924	-1.000	.890	-1.000	-1.000	.875
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.939	.951	.894	-1.000	.953	.954	-1.000	.948	-1.000	-1.000	.906

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0313	.0154	.0301	-1.0000	.0167	.0182	-1.0000	.0194	-1.0000	-1.0000	.0381
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.798	.857	.714	-1.000	.861	.848	-1.000	.799	-1.000	-1.000	.595
V_*	.898	.906	.810	-1.000	.914	.906	-1.000	.860	-1.000	-1.000	.716
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.997	.955	.906	-1.000	.967	.963	-1.000	.922	-1.000	-1.000	.838

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0080	.0464	.0510	-1.0000	.0141	.0225	-1.0000	.0414	-1.0000	-1.0000	.0241
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.867	.684	.565	-1.000	.852	.818	-1.000	.705	-1.000	-1.000	.725
V_*	.888	.803	.696	-1.000	.888	.875	-1.000	.811	-1.000	-1.000	.787
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.908	.923	.827	-1.000	.924	.933	-1.000	.918	-1.000	-1.000	.849

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0621	.0329	.0441	-1.0000	.0343	.0365	-1.0000	.0409	-1.0000	-1.0000	.0863
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.634	.741	.530	-1.000	.746	.726	-1.000	.634	-1.000	-1.000	.241
V_*	.831	.845	.670	-1.000	.855	.842	-1.000	.764	-1.000	-1.000	.515
$V_* + t_{(.975,d)}\hat{\sigma}_*$	1.029	.950	.810	-1.000	.964	.958	-1.000	.894	-1.000	-1.000	.790

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0082	.0530	.0354	-1.0000	.0147	.0272	-1.0000	.0448	-1.0000	-1.0000	.0196
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.279	.258	.400	-1.000	.260	.248	-1.000	.269	-1.000	-1.000	.357
V_*	.300	.395	.491	-1.000	.298	.318	-1.000	.384	-1.000	-1.000	.407
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.321	.531	.582	-1.000	.336	.388	-1.000	.500	-1.000	-1.000	.458

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0450	.0153	.0561	-1.0000	.0197	.0228	-1.0000	.0173	-1.0000	-1.0000	.0210
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.239	.313	.333	-1.000	.283	.291	-1.000	.385	-1.000	-1.000	.560
V_*	.383	.361	.512	-1.000	.346	.363	-1.000	.440	-1.000	-1.000	.627
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.526	.410	.690	-1.000	.408	.436	-1.000	.495	-1.000	-1.000	.694

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0057	.0435	.0316	-1.0000	.0128	.0229	-1.0000	.0350	-1.0000	-1.0000	.0150
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.222	.202	.309	-1.000	.203	.191	-1.000	.218	-1.000	-1.000	.287
V_*	.237	.314	.390	-1.000	.236	.250	-1.000	.308	-1.000	-1.000	.326
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.251	.426	.471	-1.000	.269	.308	-1.000	.398	-1.000	-1.000	.365

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0379	.0122	.0454	-1.0000	.0169	.0176	-1.0000	.0149	-1.0000	-1.0000	.0199
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.179	.242	.261	-1.000	.219	.228	-1.000	.298	-1.000	-1.000	.433
V_*	.299	.281	.406	-1.000	.273	.285	-1.000	.346	-1.000	-1.000	.496
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.419	.320	.550	-1.000	.326	.341	-1.000	.393	-1.000	-1.000	.559

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0519	.1871	.2258	-1.0000	.0575	.0748	-1.0000	.1374	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.327	-.415	-1.022	-1.000	.319	.201	-1.000	-.244	-1.000	-1.000	0.000
V_*	.461	.065	-.441	-1.000	.467	.393	-1.000	.109	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.594	.546	.139	-1.000	.615	.585	-1.000	.462	-1.000	-1.000	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0797	.0372	.1473	-1.0000	.0198	.0530	-1.0000	.0120	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.379	.551	-.127	-1.000	.633	.499	-1.000	.469	-1.000	-1.000	0.000
V_*	.633	.670	.342	-1.000	.696	.668	-1.000	.507	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.886	.788	.811	-1.000	.759	.837	-1.000	.545	-1.000	-1.000	0.000

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0485	.1967	.2252	-1.0000	.0527	.0798	-1.0000	.1407	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.352	-.425	-.995	-1.000	.342	.211	-1.000	-.250	-1.000	-1.000	0.000
V_*	.477	.081	-.417	-1.000	.477	.416	-1.000	.111	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.602	.586	.162	-1.000	.613	.621	-1.000	.473	-1.000	-1.000	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0841	.0387	.1476	-1.0000	.0188	.0529	-1.0000	.0127	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.375	.558	-.131	-1.000	.638	.506	-1.000	.474	-1.000	-1.000	0.000
V_*	.642	.681	.339	-1.000	.698	.674	-1.000	.514	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.910	.804	.808	-1.000	.757	.842	-1.000	.555	-1.000	-1.000	0.000

$\hat{\sigma}_* = \sqrt{\text{Var}(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0224	.0355	.0194	-1.0000	.0375	.0363	-1.0000	.0184	-1.0000	-1.0000	.0819
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.017	-.073	-.020	-1.000	-.063	-.226	-1.000	-.033	-1.000	-1.000	-.217
V_*	.040	.018	.029	-1.000	.033	-.133	-1.000	.014	-1.000	-1.000	-.007
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.098	.109	.079	-1.000	.130	-.040	-1.000	.061	-1.000	-1.000	.204

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0307	.0166	.0266	-1.0000	.0381	.0221	-1.0000	.0286	-1.0000	-1.0000	.0666
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.088	-.049	-.118	-1.000	-.123	-.235	-1.000	-.048	-1.000	-1.000	-.250
V_*	.010	.003	-.034	-1.000	-.002	-.165	-1.000	.043	-1.000	-1.000	-.039
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.108	.056	.051	-1.000	.120	-.095	-1.000	.134	-1.000	-1.000	.173

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0311	.0334	.0249	-1.0000	.0328	.0365	-1.0000	.0198	-1.0000	-1.0000	.0973
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.121	-.127	-.072	-1.000	-.120	-.059	-1.000	-.058	-1.000	-1.000	-.259
V_*	-.041	-.041	-.008	-1.000	-.036	.035	-1.000	-.007	-1.000	-1.000	-.009
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.039	.045	.056	-1.000	.049	.129	-1.000	.044	-1.000	-1.000	.241

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0279	.0279	.0288	-1.0000	.0527	.0289	-1.0000	.0361	-1.0000	-1.0000	.0495
$V_* - t_{(.975,d)}\hat{\sigma}_*$	-.192	-.194	-.144	-1.000	-.229	-.111	-1.000	-.099	-1.000	-1.000	-.184
V_*	-.103	-.106	-.052	-1.000	-.061	-.019	-1.000	.016	-1.000	-1.000	-.026
$V_* + t_{(.975,d)}\hat{\sigma}_*$	-.014	-.017	.040	-1.000	.106	.073	-1.000	.131	-1.000	-1.000	.131

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0125	.0222	.0405	-1.0000	.0098	.0321	-1.0000	.0204	-1.0000	-1.0000	.0422
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.821	.653	.610	-1.000	.849	.704	-1.000	.703	-1.000	-1.000	.548
V_*	.853	.710	.714	-1.000	.875	.787	-1.000	.756	-1.000	-1.000	.657
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.885	.767	.818	-1.000	.900	.869	-1.000	.808	-1.000	-1.000	.765

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0273	.0401	.0294	-1.0000	.0123	.0244	-1.0000	.0306	-1.0000	-1.0000	.0111
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.755	.581	.667	-1.000	.836	.751	-1.000	.639	-1.000	-1.000	.558
V_*	.842	.709	.760	-1.000	.875	.829	-1.000	.736	-1.000	-1.000	.594
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.929	.837	.854	-1.000	.914	.907	-1.000	.834	-1.000	-1.000	.629

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0154	.0695	.1027	-1.0000	.0272	.0656	-1.0000	.0492	-1.0000	-1.0000	.0735
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.741	.368	.239	-1.000	.769	.488	-1.000	.491	-1.000	-1.000	.245
V_*	.780	.547	.503	-1.000	.839	.657	-1.000	.617	-1.000	-1.000	.434
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.820	.725	.767	-1.000	.909	.825	-1.000	.744	-1.000	-1.000	.623

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0482	.0664	.0575	-1.0000	.0198	.0438	-1.0000	.0505	-1.0000	-1.0000	.0366
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.610	.370	.447	-1.000	.753	.616	-1.000	.444	-1.000	-1.000	.289
V_*	.764	.581	.630	-1.000	.816	.755	-1.000	.605	-1.000	-1.000	.405
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.917	.792	.813	-1.000	.879	.894	-1.000	.766	-1.000	-1.000	.521

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0427	.0425	.0465	-1.0000	.0329	.0561	-1.0000	.0432	-1.0000	-1.0000	.0660
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.494	.740	.726	-1.000	.474	.586	-1.000	.668	-1.000	-1.000	.756
V_*	.603	.850	.846	-1.000	.558	.730	-1.000	.779	-1.000	-1.000	.925
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.713	.959	.965	-1.000	.643	.874	-1.000	.891	-1.000	-1.000	1.095

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0737	.0502	.0725	-1.0000	.0422	.0524	-1.0000	.0649	-1.0000	-1.0000	.0400
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.434	.749	.591	-1.000	.458	.529	-1.000	.656	-1.000	-1.000	.942
V_*	.668	.908	.821	-1.000	.592	.695	-1.000	.862	-1.000	-1.000	1.070
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.903	1.068	1.052	-1.000	.727	.862	-1.000	1.069	-1.000	-1.000	1.197

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0305	.0350	.0483	-1.0000	.0235	.0447	-1.0000	.0238	-1.0000	-1.0000	.0434
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.293	.446	.439	-1.000	.259	.352	-1.000	.431	-1.000	-1.000	.486
V_*	.371	.536	.563	-1.000	.320	.467	-1.000	.492	-1.000	-1.000	.597
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.449	.625	.687	-1.000	.380	.582	-1.000	.553	-1.000	-1.000	.709

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0647	.0548	.0613	-1.0000	.0437	.0443	-1.0000	.0657	-1.0000	-1.0000	.0256
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.239	.419	.361	-1.000	.252	.313	-1.000	.364	-1.000	-1.000	.624
V_*	.445	.593	.556	-1.000	.391	.454	-1.000	.573	-1.000	-1.000	.705
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.650	.767	.751	-1.000	.530	.595	-1.000	.782	-1.000	-1.000	.787

$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	UBC	CEQ	ERM	NAM	TAN	HBV	SRM	SSA	PRM	NWS	DAY
$\hat{\sigma}_*$	.0340	.1367	.1600	-1.0000	.0562	.1162	-1.0000	.0920	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.488	-.182	-.229	-1.000	.496	.088	-1.000	.061	-1.000	-1.000	0.000
V_*	.576	.169	.182	-1.000	.641	.387	-1.000	.297	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.663	.520	.593	-1.000	.785	.685	-1.000	.534	-1.000	-1.000	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0736	.1001	.0801	-1.0000	.0321	.0709	-1.0000	.0737	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.379	-.034	.157	-1.000	.592	.356	-1.000	.117	-1.000	-1.000	0.000
V_*	.613	.284	.412	-1.000	.694	.582	-1.000	.351	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.847	.603	.667	-1.000	.796	.807	-1.000	.586	-1.000	-1.000	0.000

SNOWMELT SEASON

CALIBRATION PERIOD

$\hat{\sigma}_*$	.0415	.1482	.1932	-1.0000	.0425	.1229	-1.0000	.0962	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.509	-.170	-.363	-1.000	.608	.083	-1.000	.083	-1.000	-1.000	0.000
V_*	.616	.211	.133	-1.000	.717	.399	-1.000	.330	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.722	.592	.630	-1.000	.826	.715	-1.000	.577	-1.000	-1.000	0.000

VERIFICATION PERIOD

$\hat{\sigma}_*$	.0962	.1176	.1115	-1.0000	.0496	.0791	-1.0000	.1123	-1.0000	-1.0000	0.0000
$V_* - t_{(.975,d)}\hat{\sigma}_*$	.302	-.076	.028	-1.000	.536	.339	-1.000	-.015	-1.000	-1.000	0.000
V_*	.608	.298	.383	-1.000	.694	.590	-1.000	.342	-1.000	-1.000	0.000
$V_* + t_{(.975,d)}\hat{\sigma}_*$	.914	.672	.737	-1.000	.852	.842	-1.000	.699	-1.000	-1.000	0.000

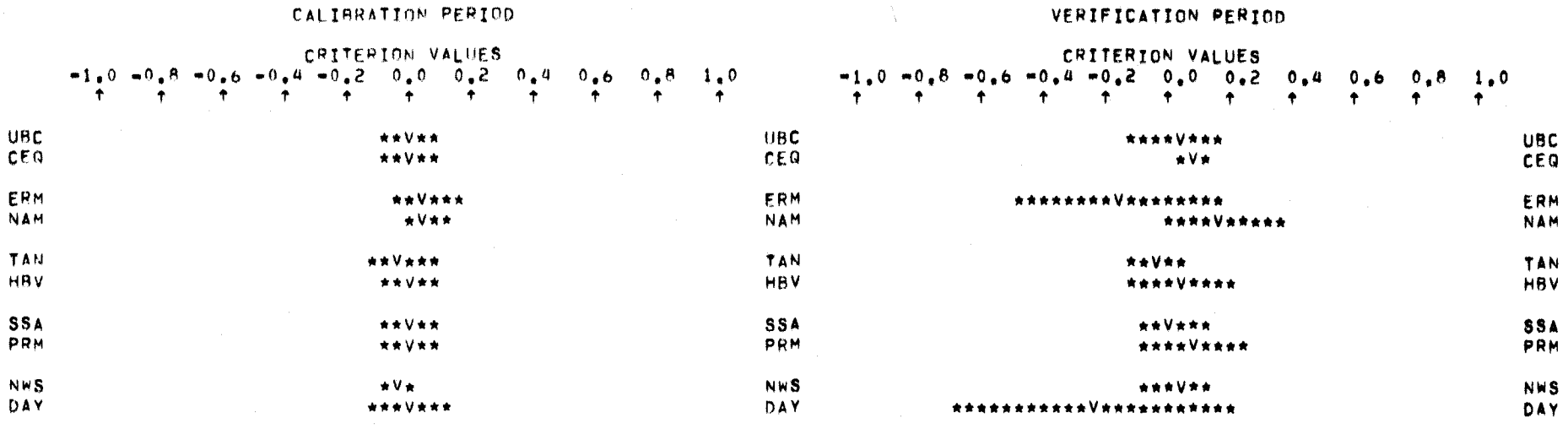
$\hat{\sigma}_* = \sqrt{Var(V_*)}$
d = degrees of freedom

APPENDIX D

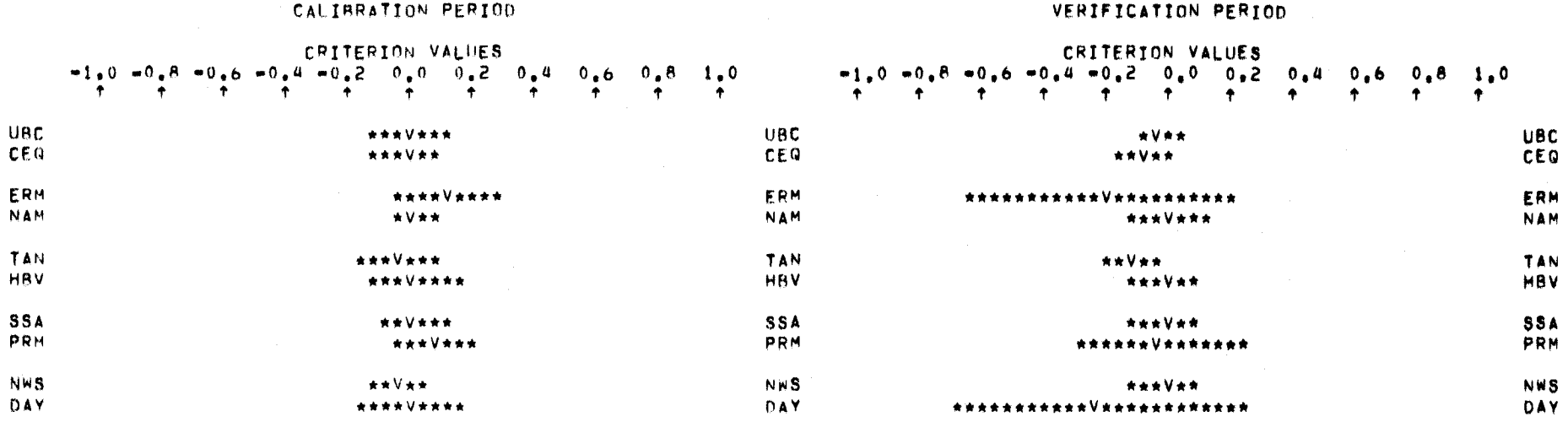
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



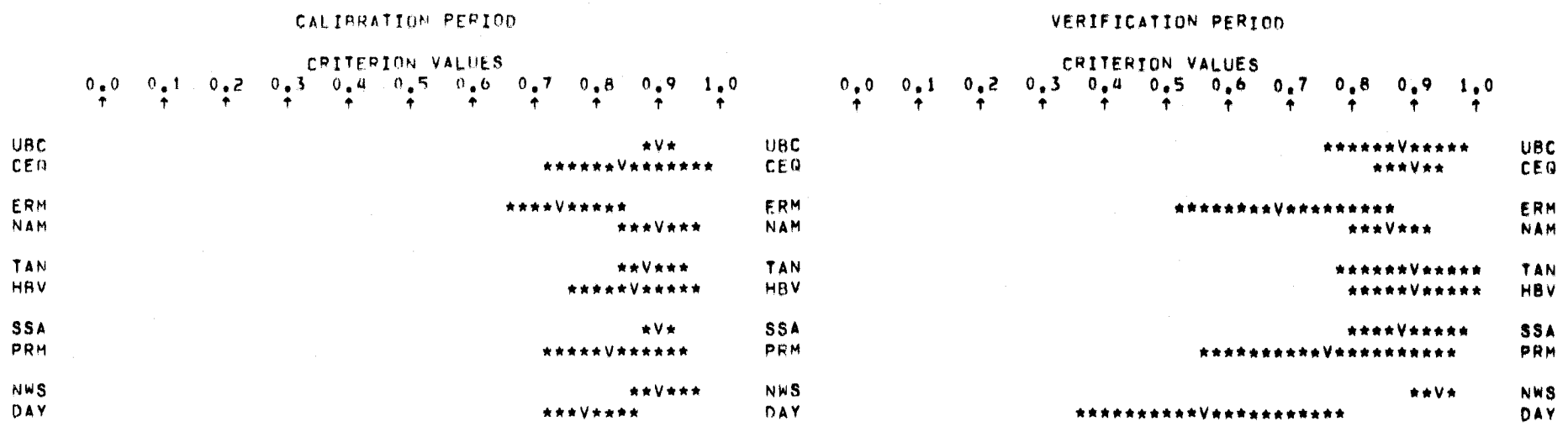
SNOWMELT SEASON



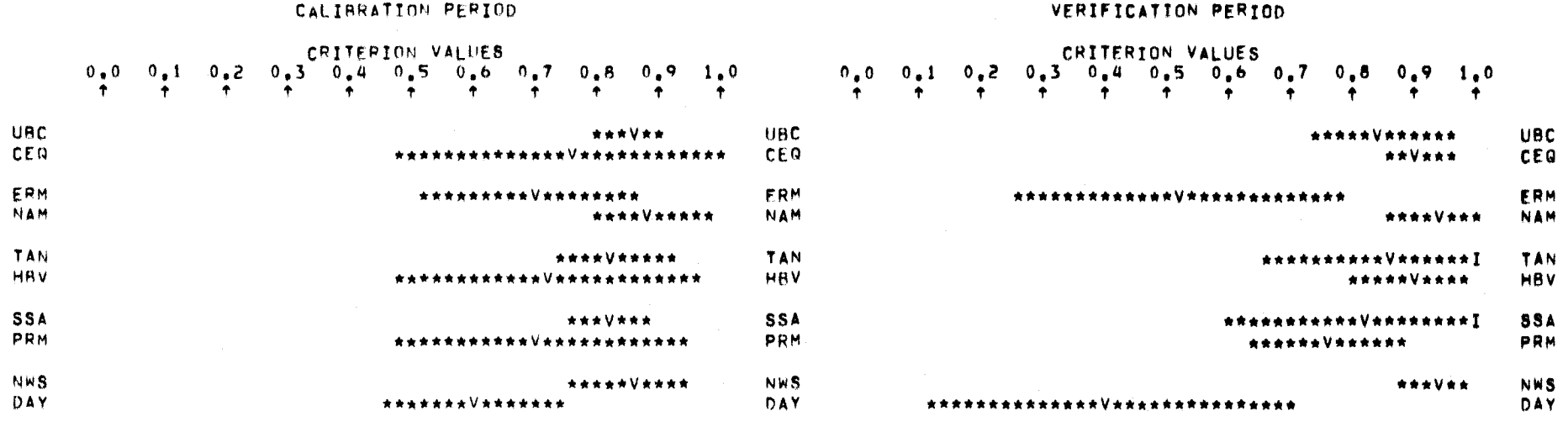
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



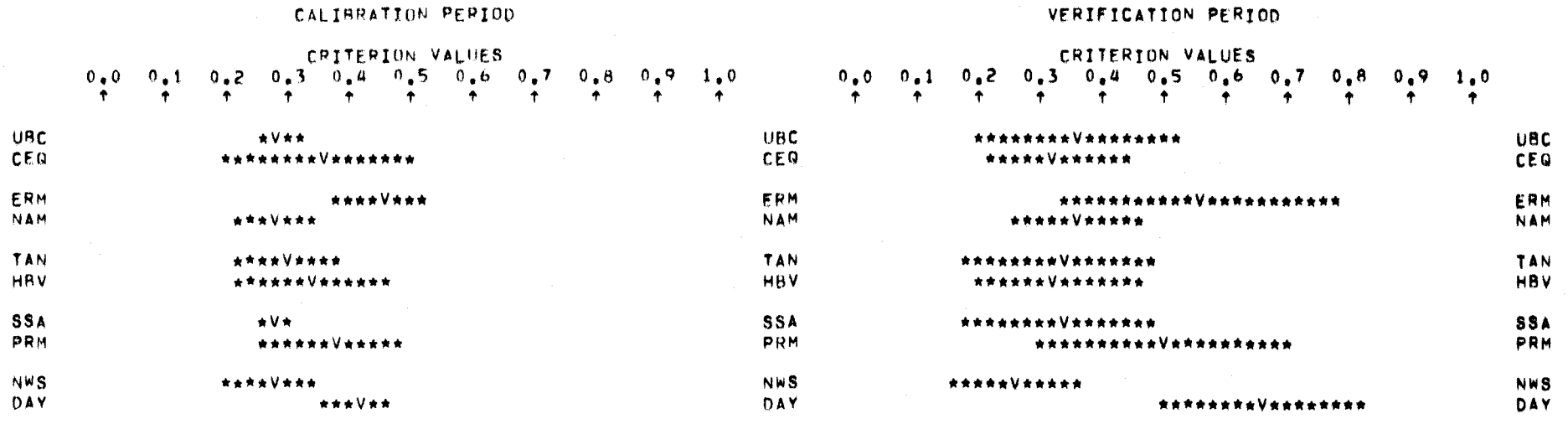
SNOWMELT SEASON



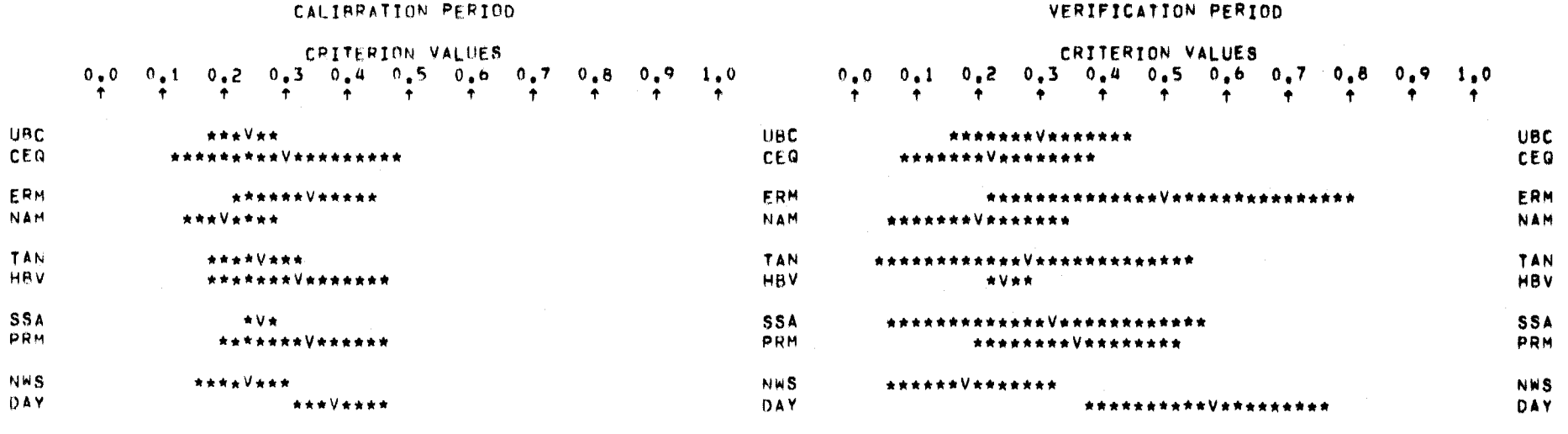
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR



SNOWMELT SEASON

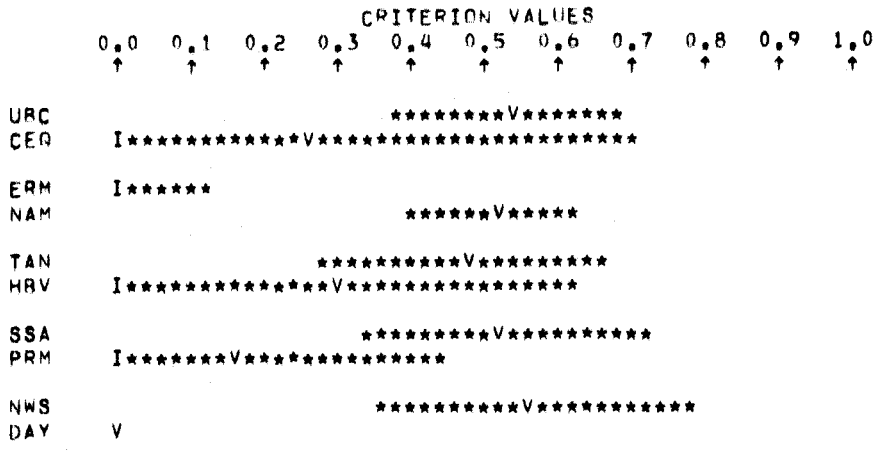


95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

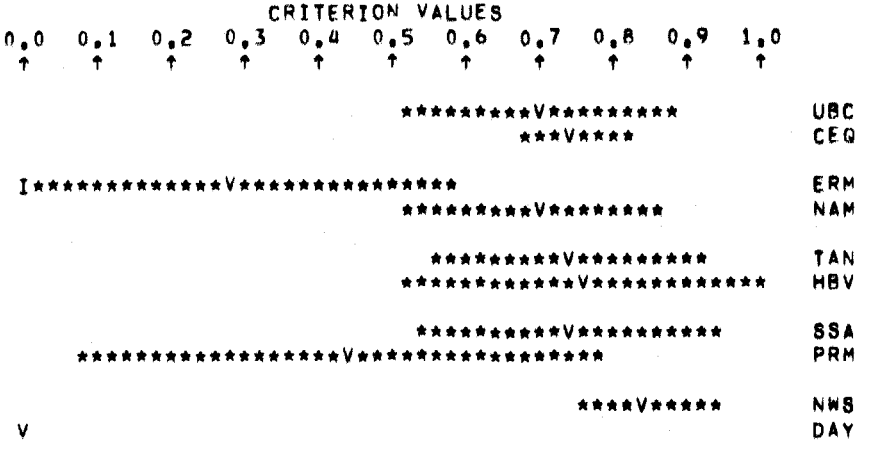
CRITERION NS
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

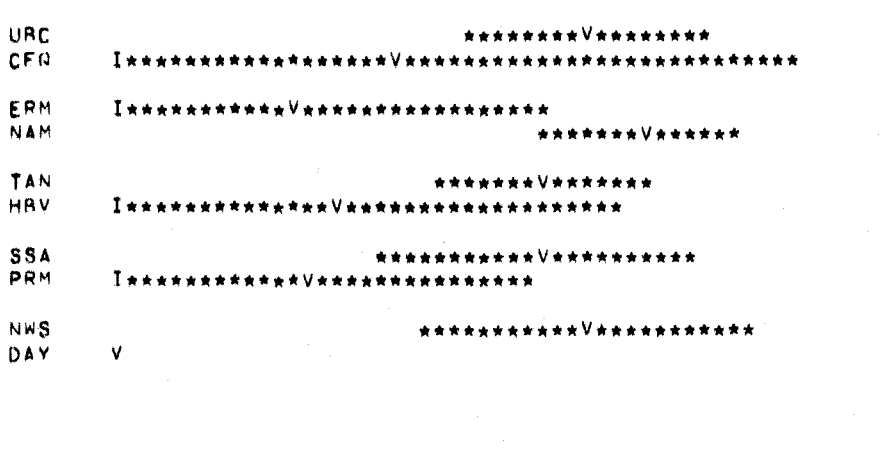


VERIFICATION PERIOD

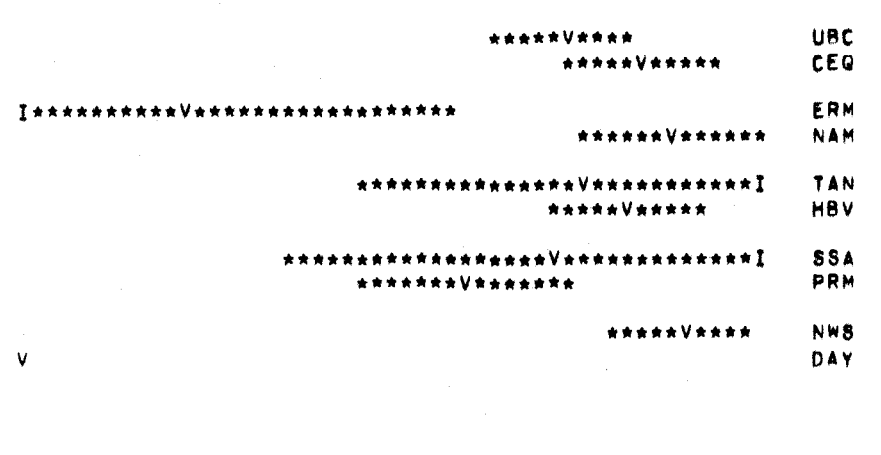


SNOWMELT SEASON

CALIBRATION PERIOD



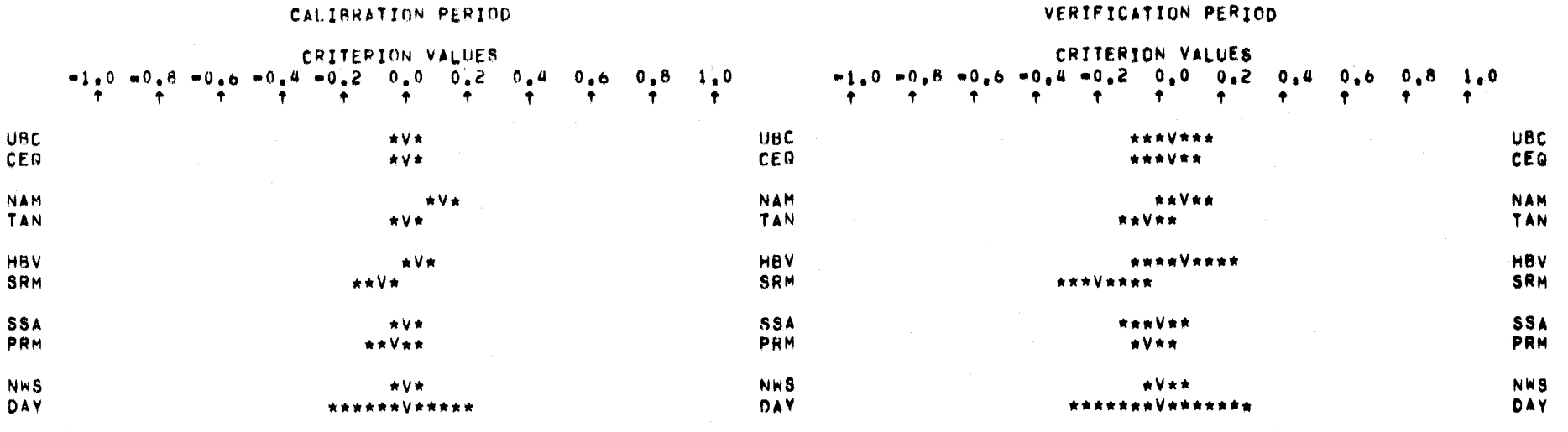
VERIFICATION PERIOD



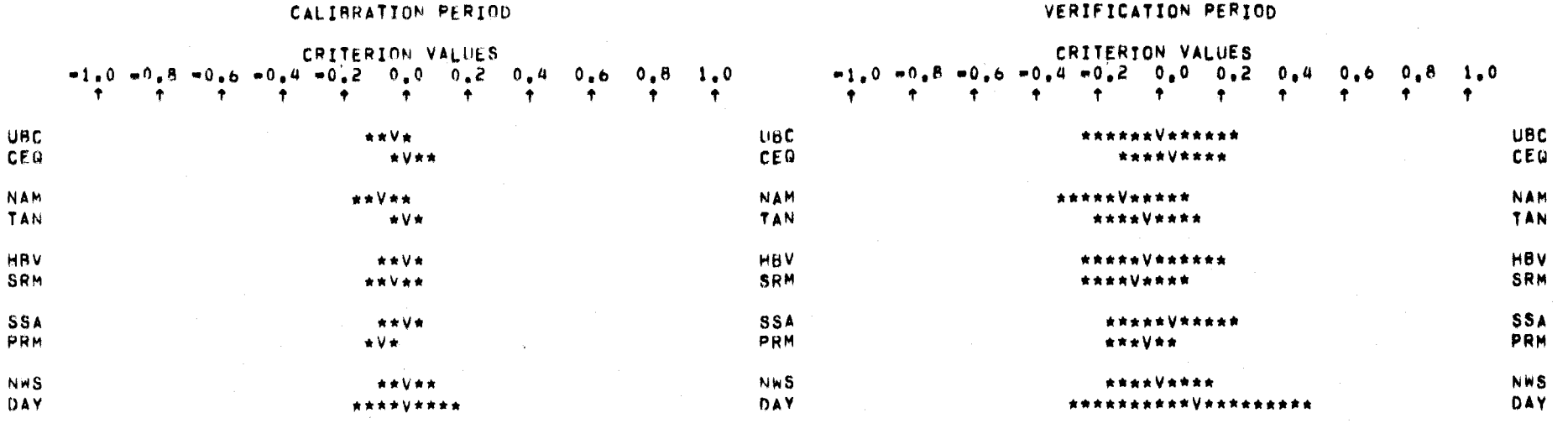
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR



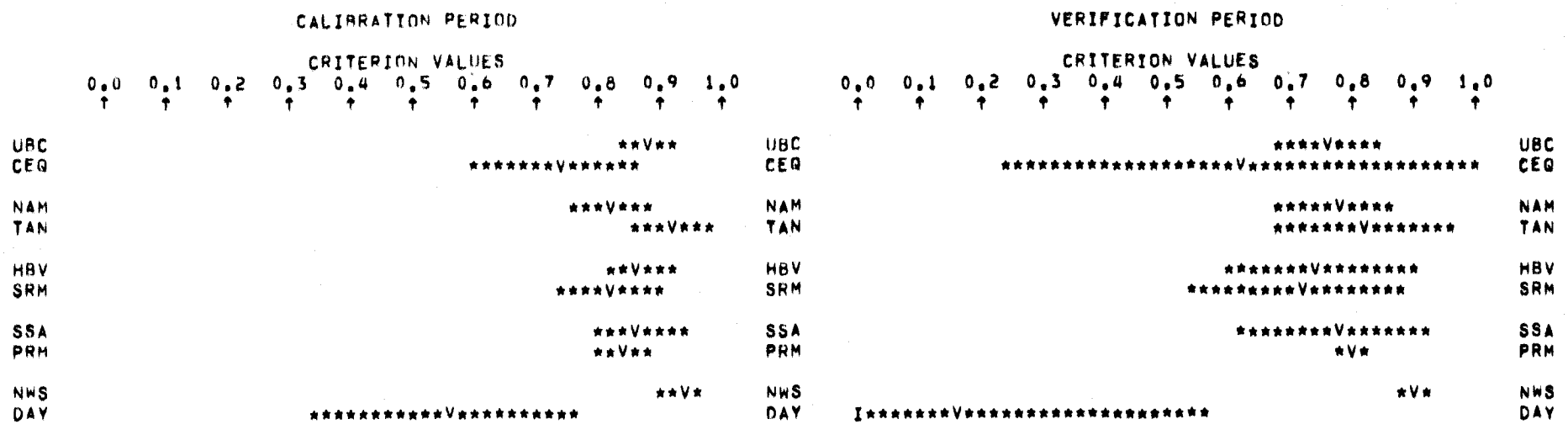
SNOWMELT SEASON



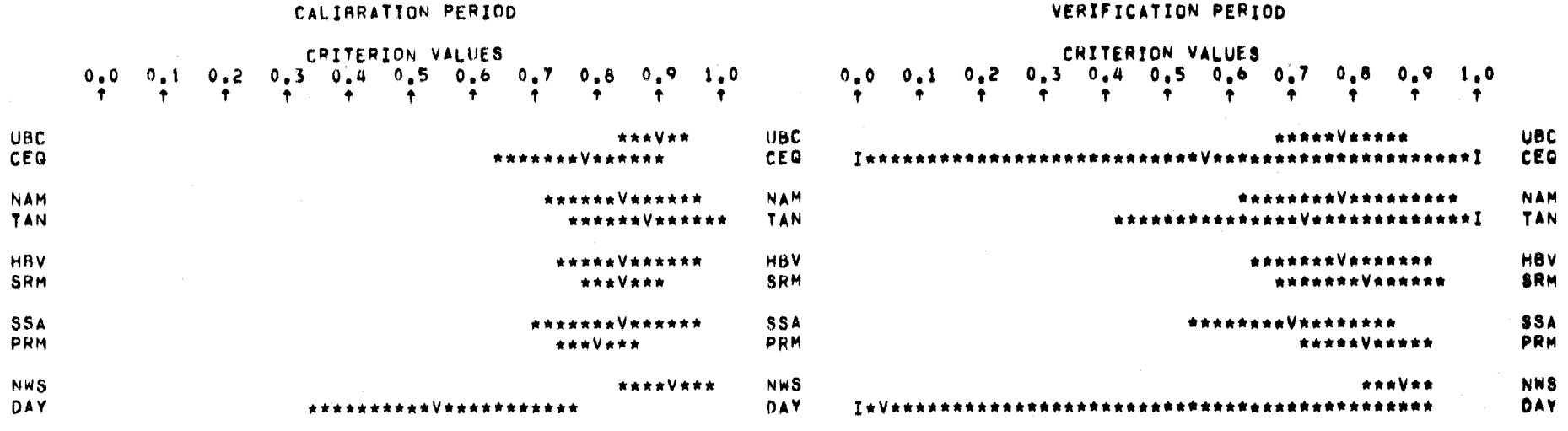
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR



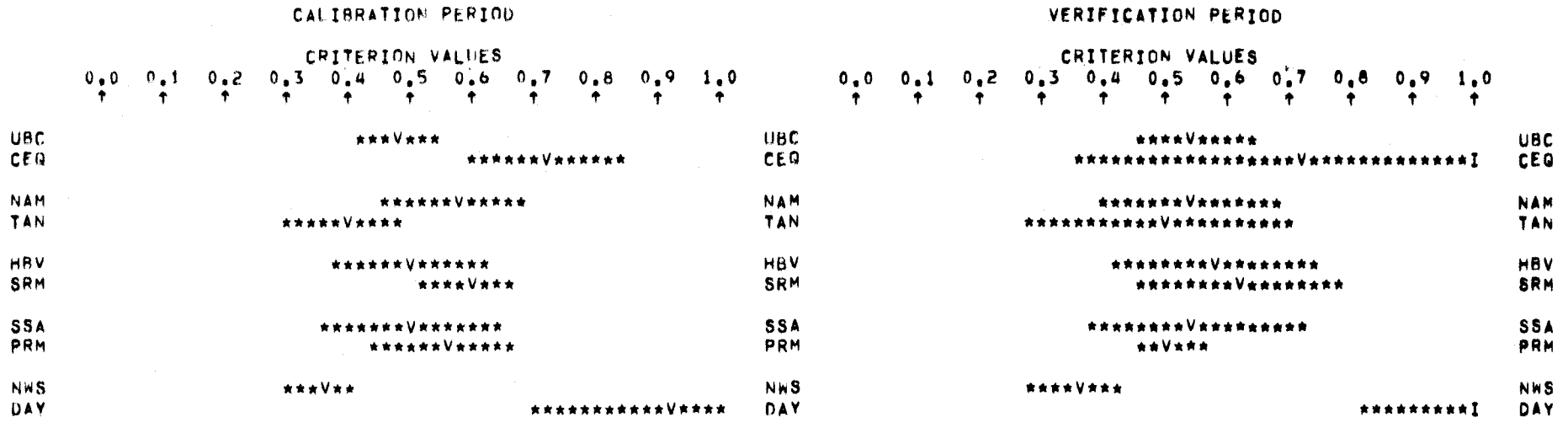
SNOWMELT SEASON



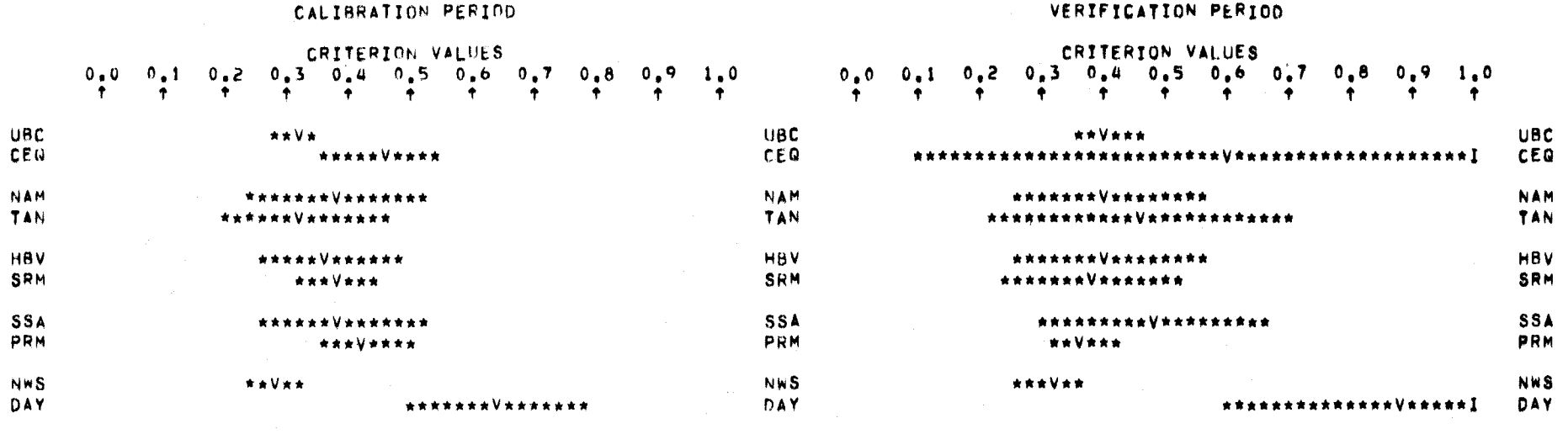
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR



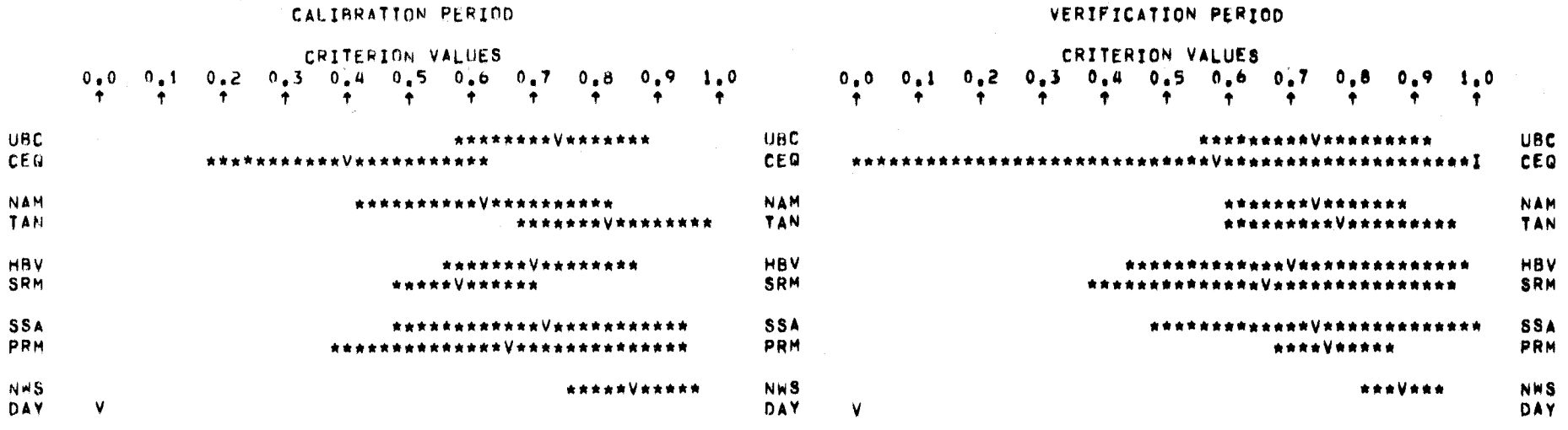
SNOWMELT SEASON



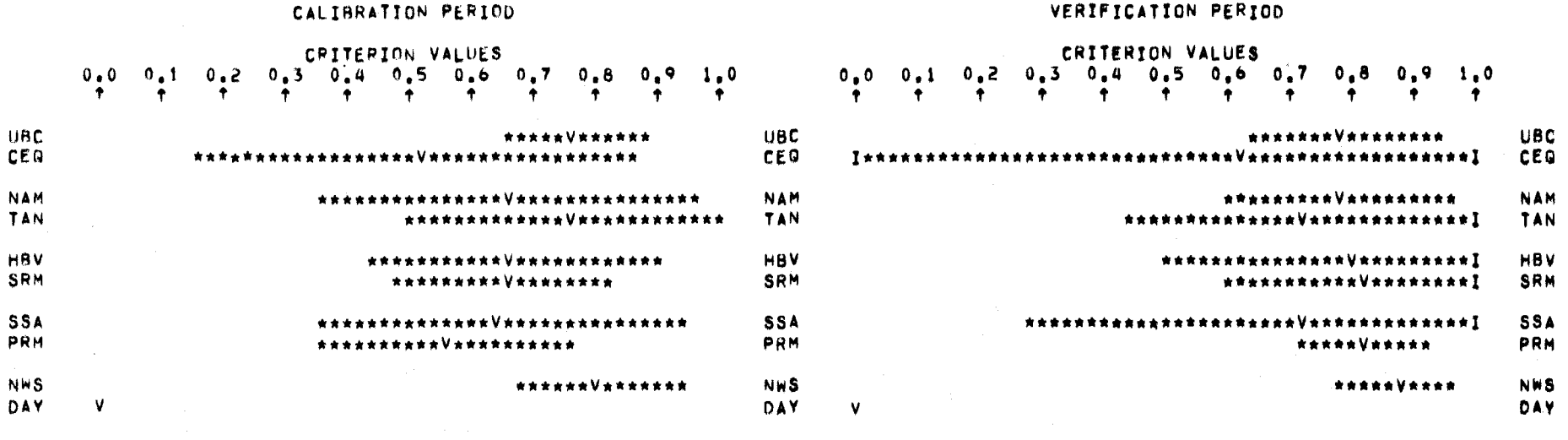
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT W3 - WATERSHED (USA)

COMPLETE YEAR



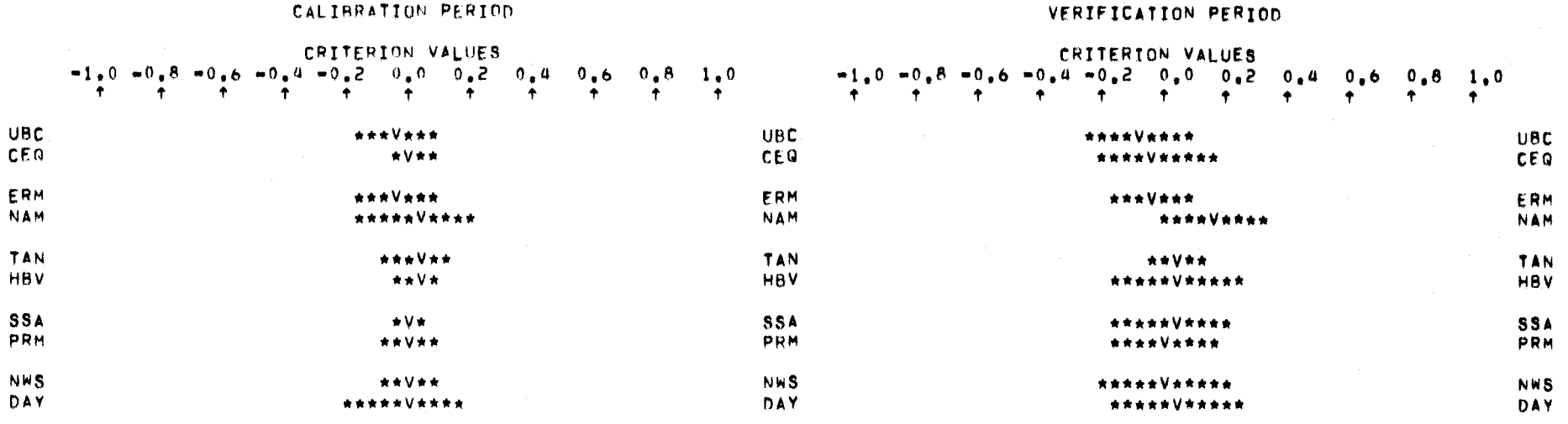
SNOWMELT SEASON



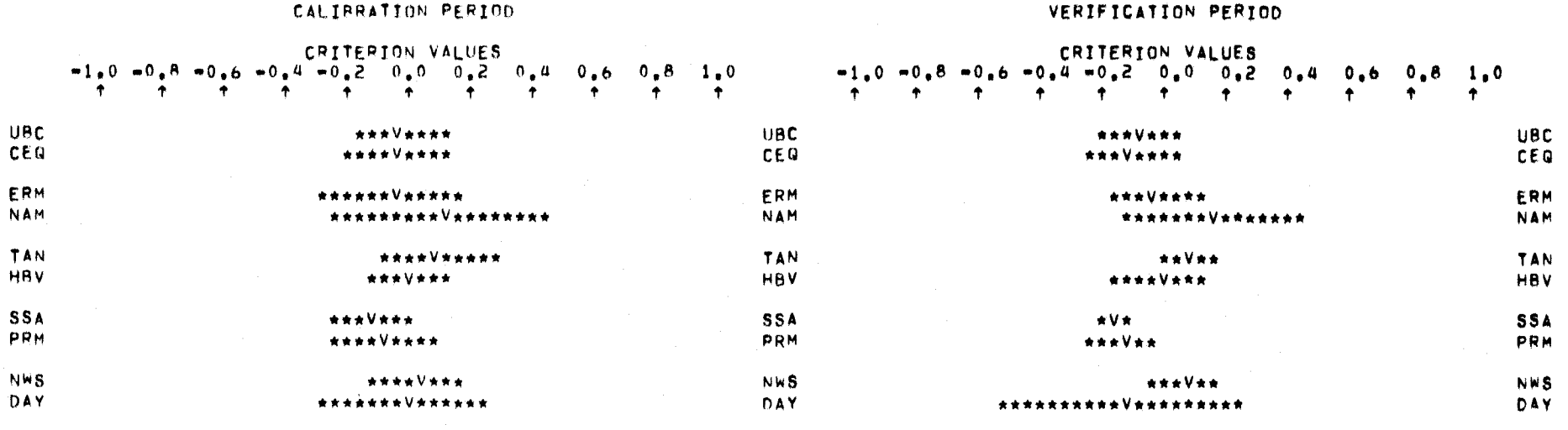
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



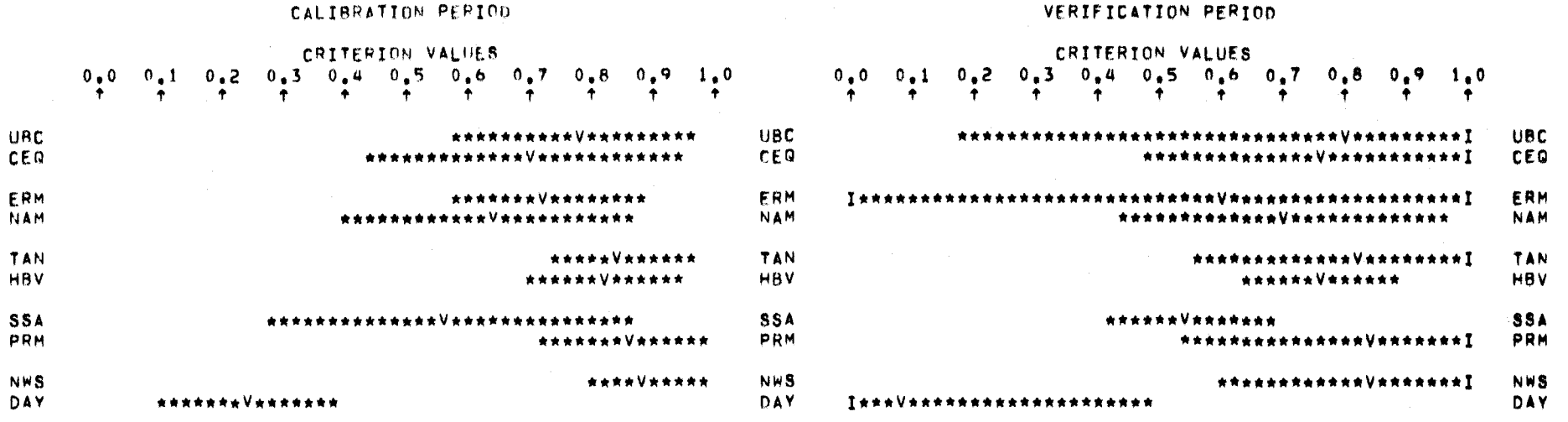
SNOWMELT SEASON



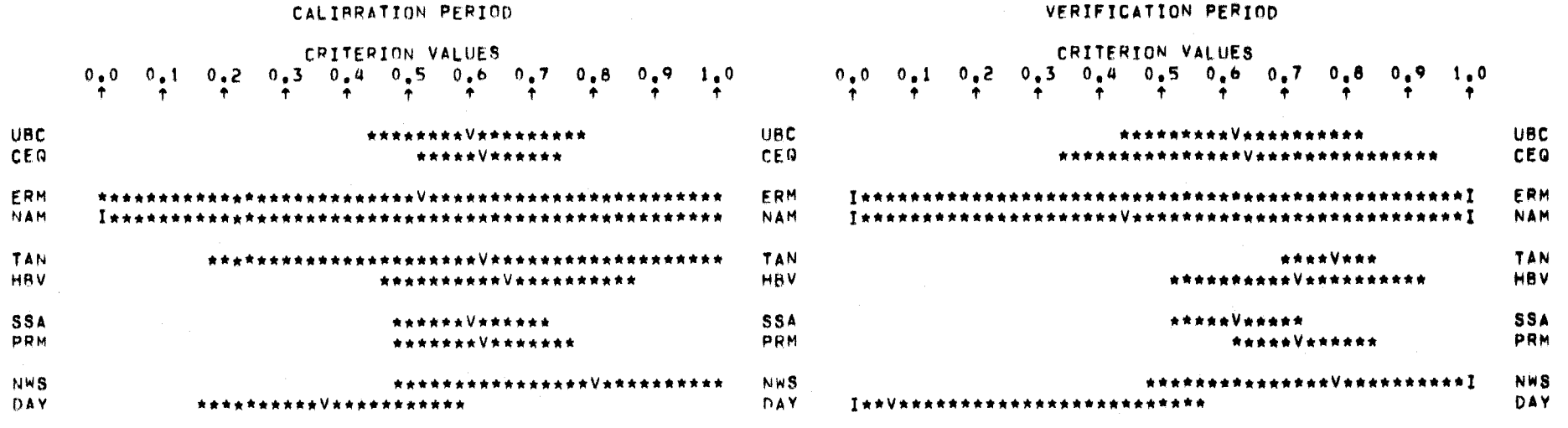
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



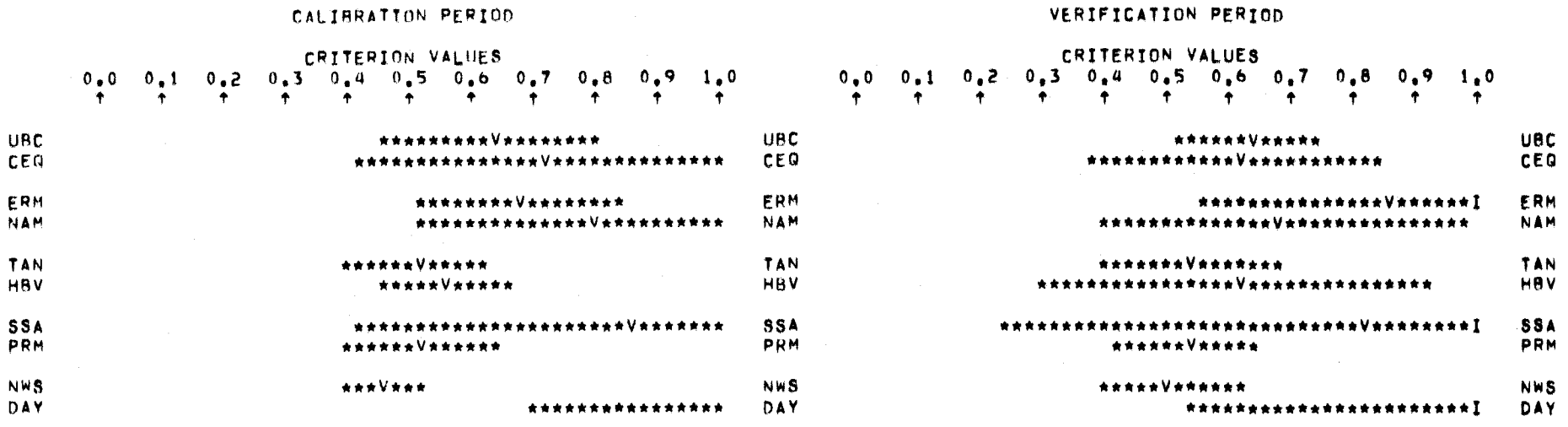
SNOWMELT SEASON



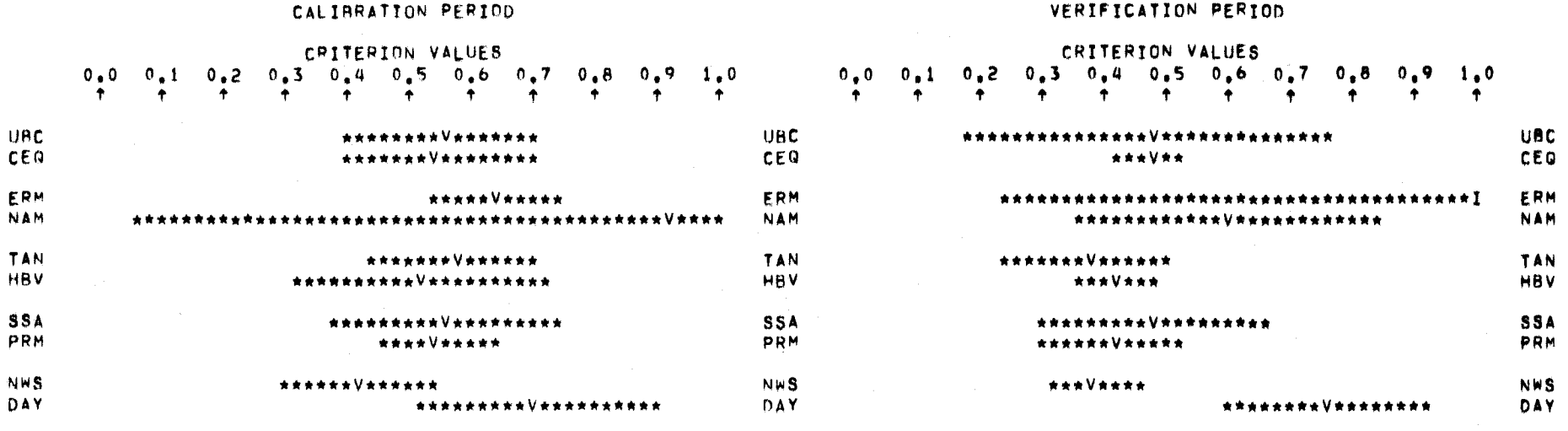
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



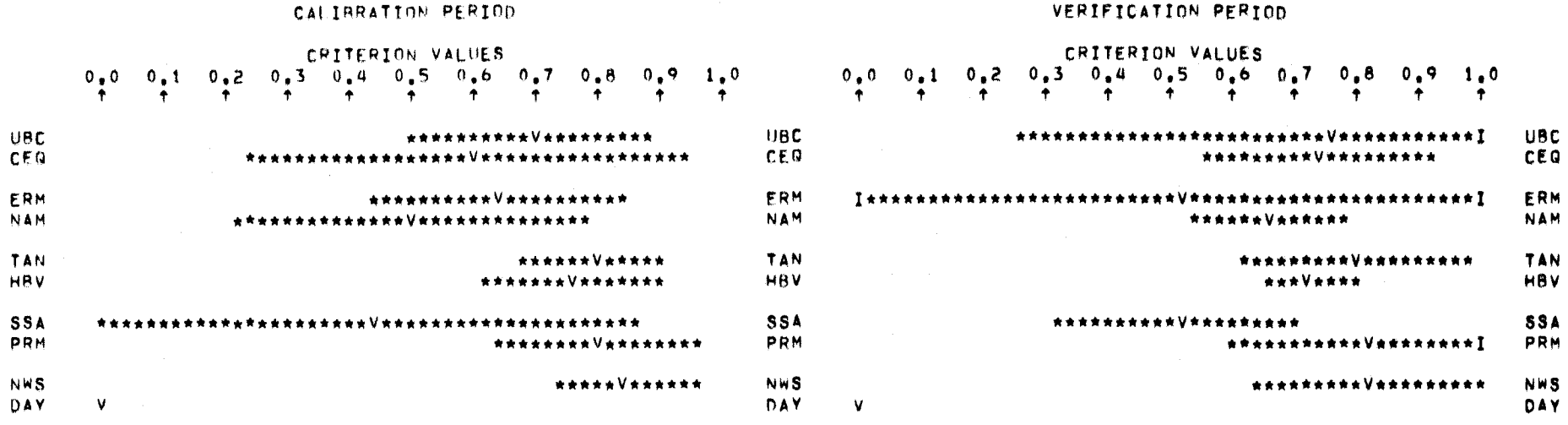
SNOWMELT SEASON



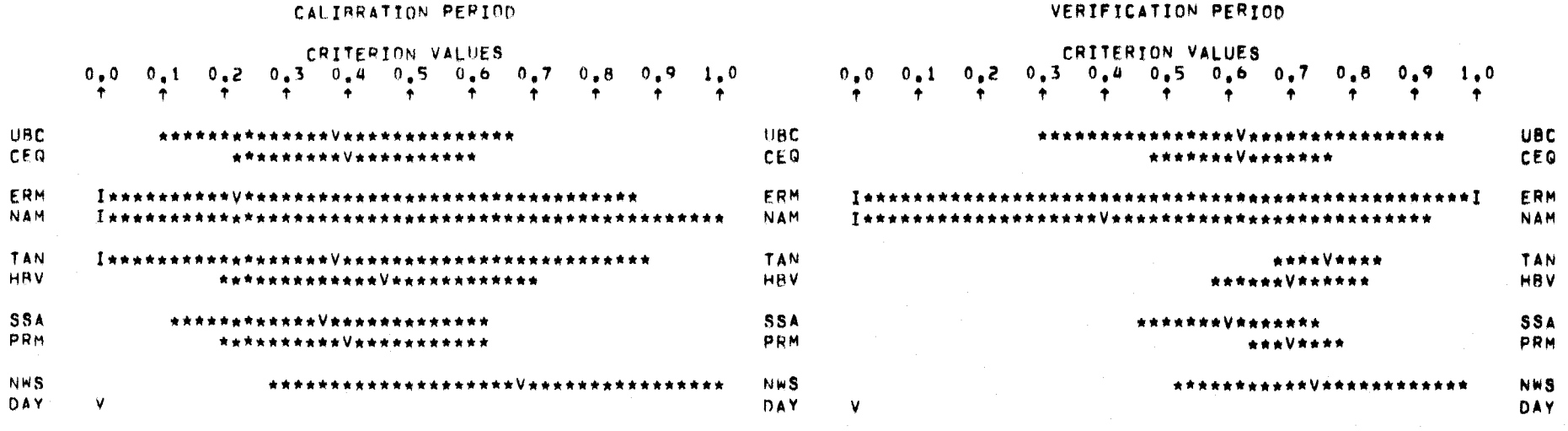
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR



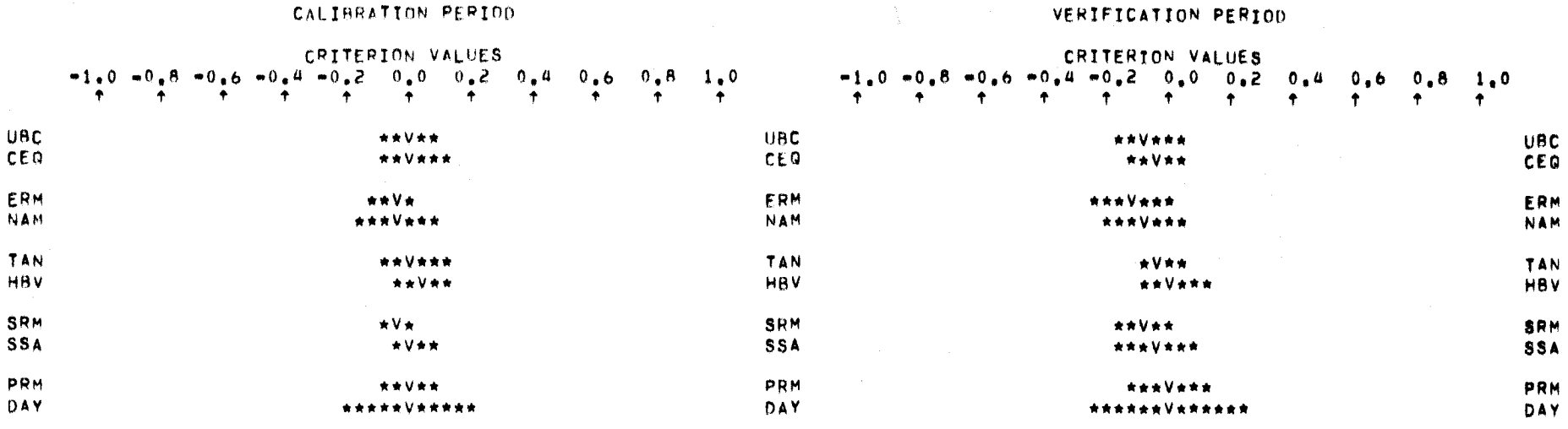
SNOWMELT SEASON



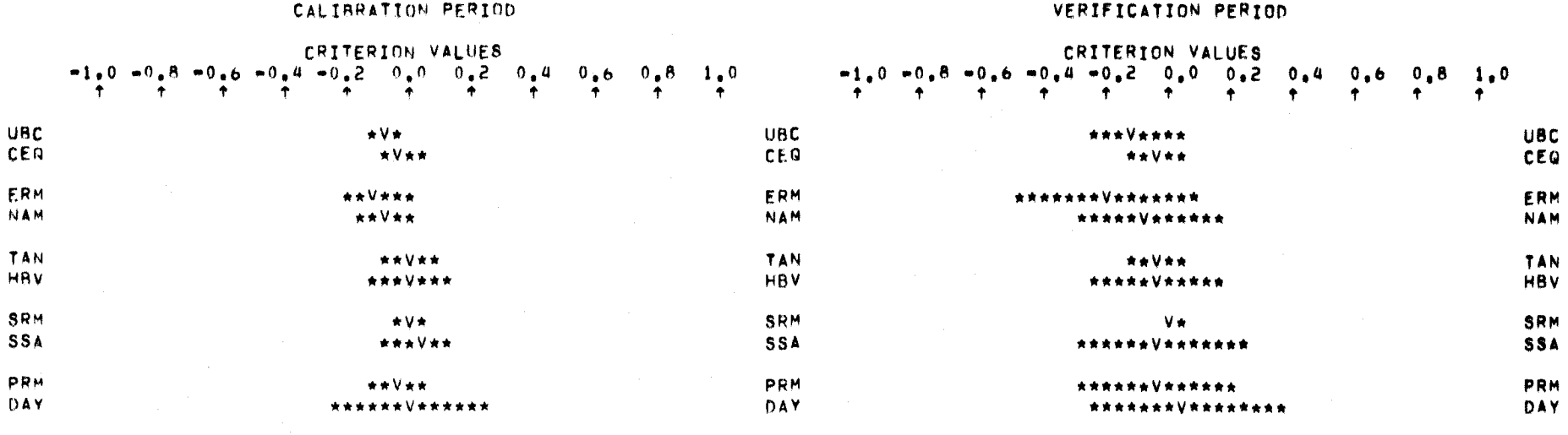
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR



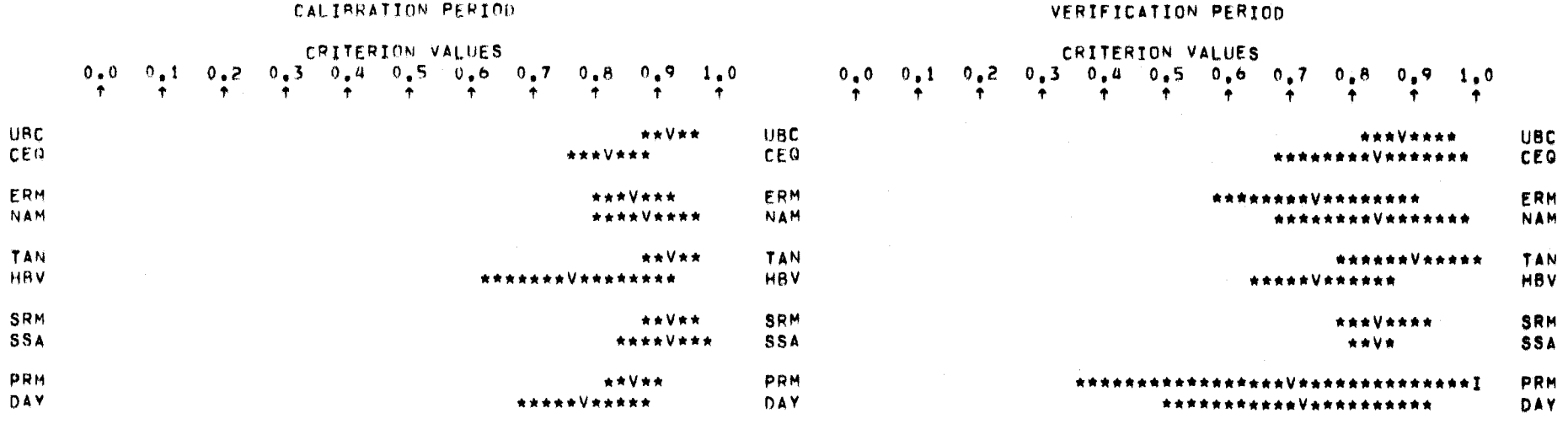
SNOWMELT SEASON



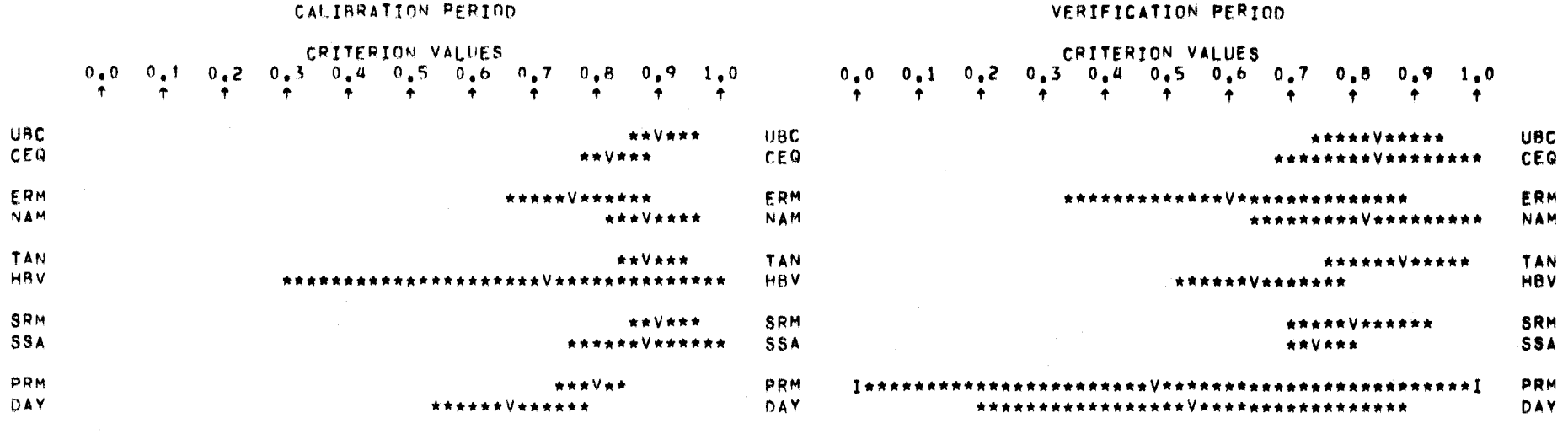
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR



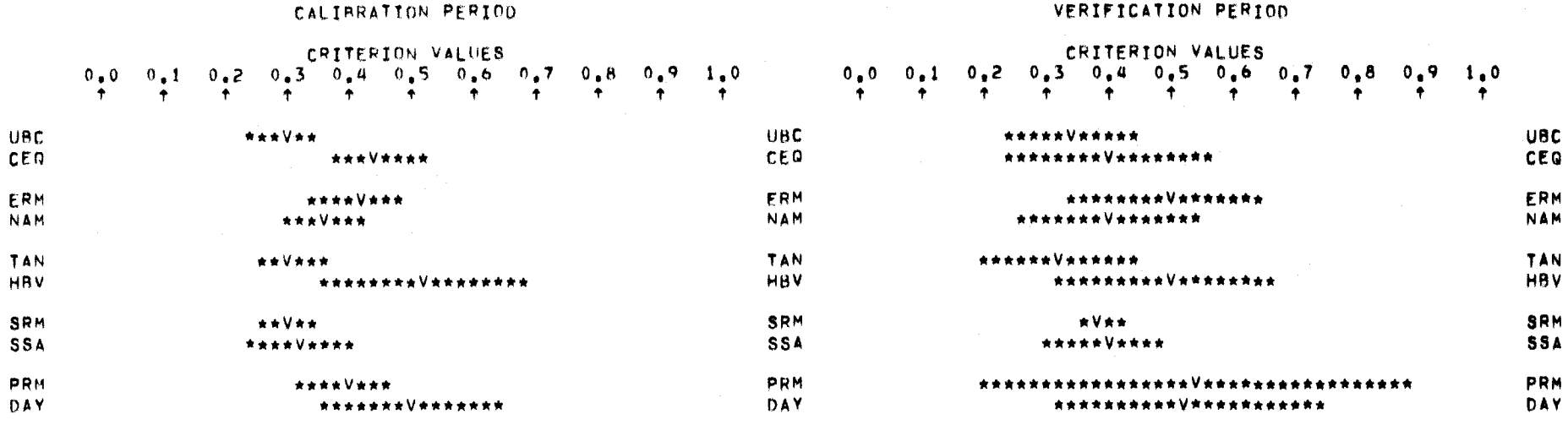
SNOWMELT SEASON



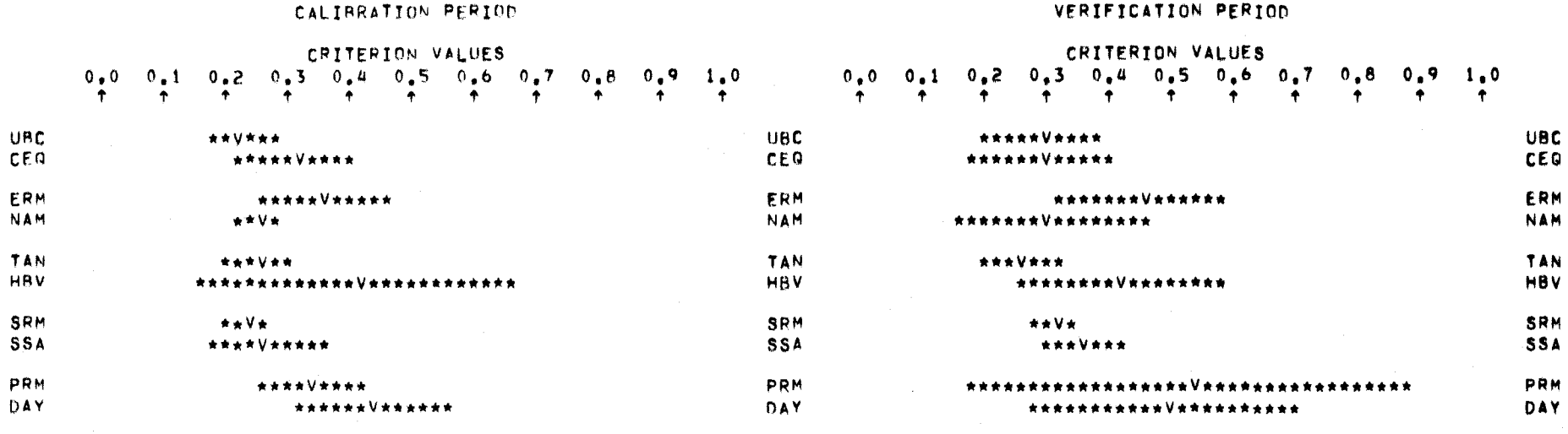
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR



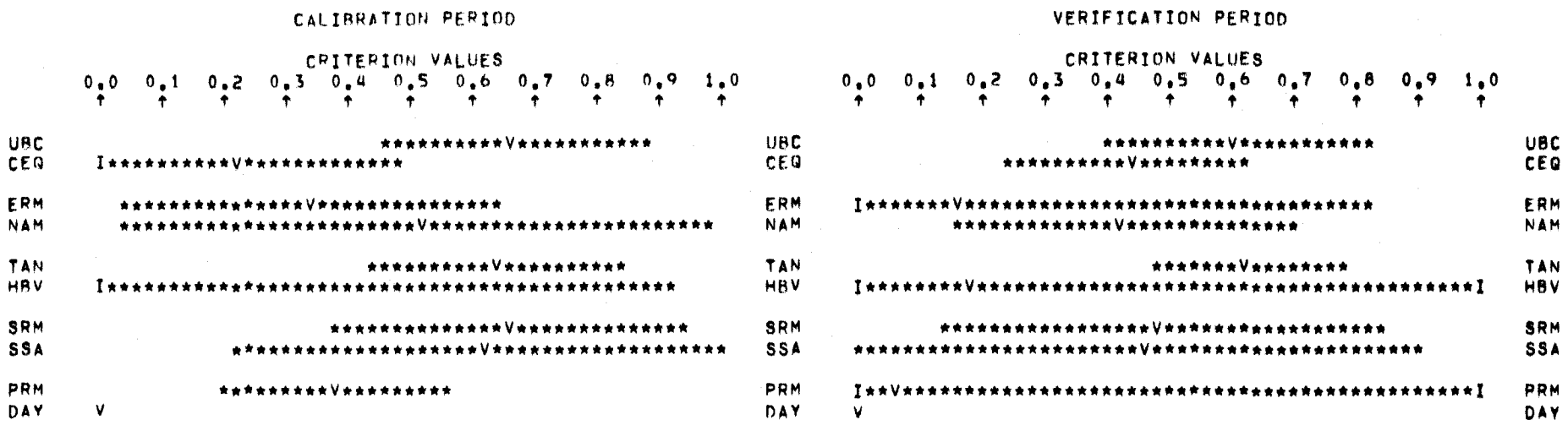
SNOWMELT SEASON



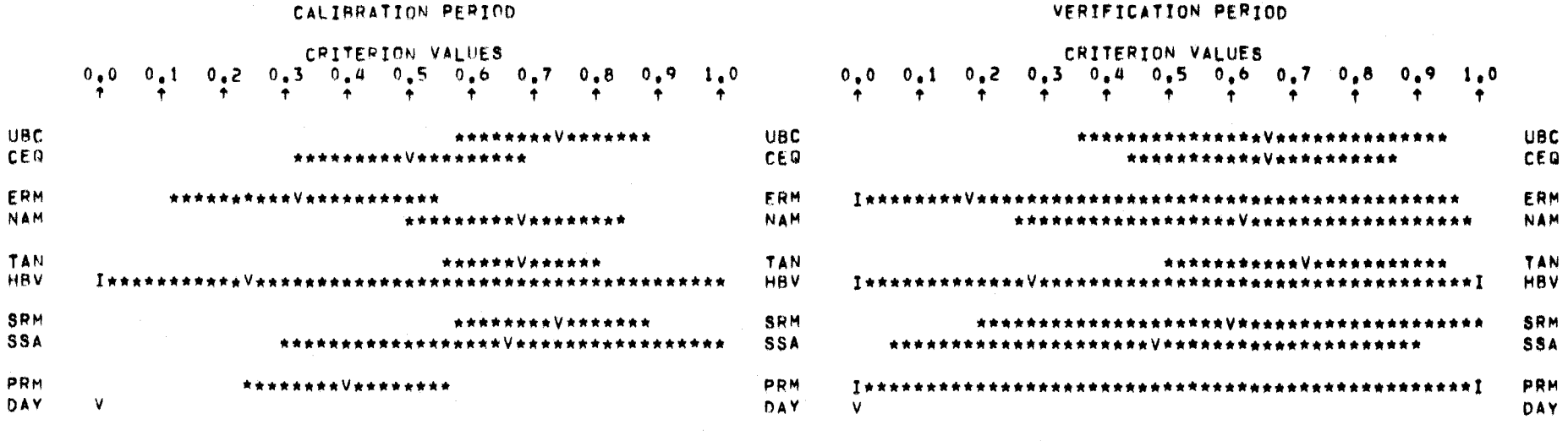
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR



SNOWMELT SEASON



95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC ***V**
CEQ *V*

ERM ****V****
TAN *V*

HBV *V*
SSA V*

DAY ***V***

VERIFICATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC ****V***
CEQ **V**

ERM *******V********
TAN ***V**

HBV **V**
SSA **V**

DAY ********V********

SNOWMELT SEASON

CALIBRATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC **V***
CEQ *V**

ERM *****V****
TAN V*

HBV *V*
SSA *V*

DAY ***V***

VERIFICATION PERIOD

CRITERION VALUES

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0

UBC ***V****
CEQ *V**

ERM ********V********
TAN **V**

HBV *V**
SSA **V*

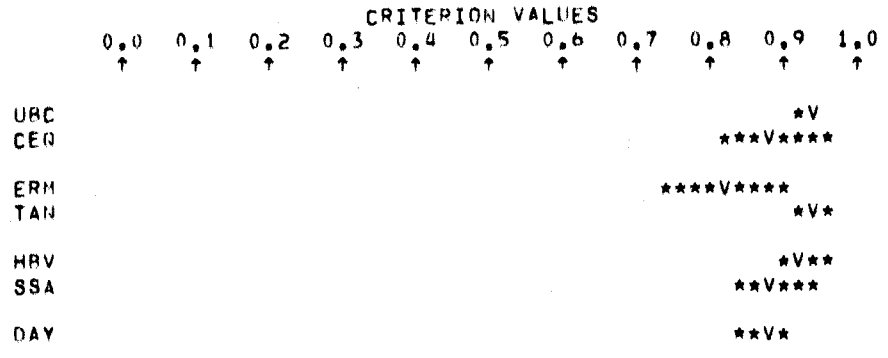
DAY *******V********

95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

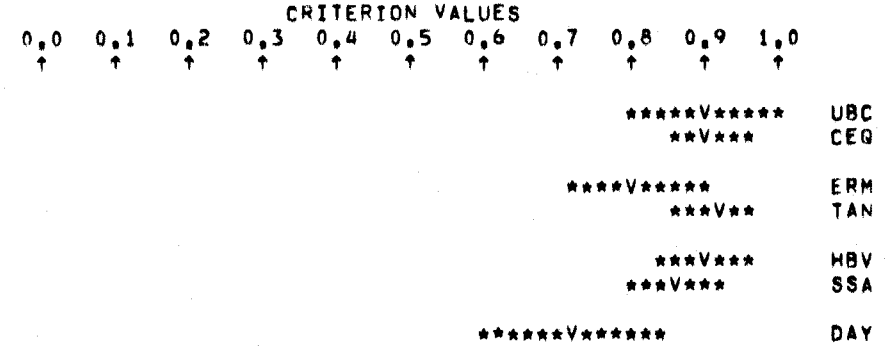
CRITERION NTD
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

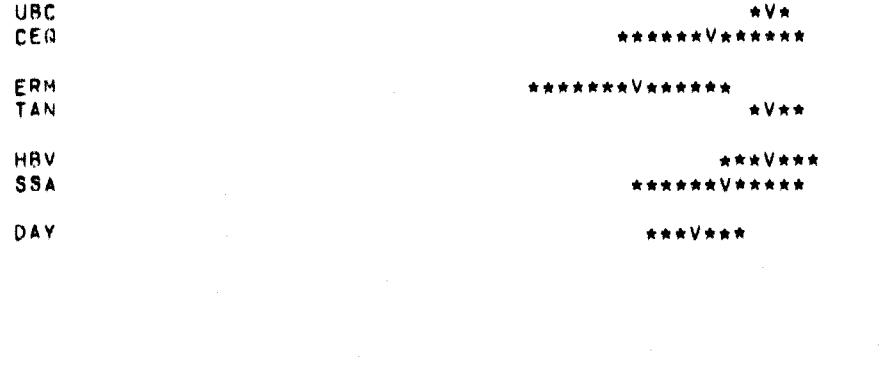


VERIFICATION PERIOD

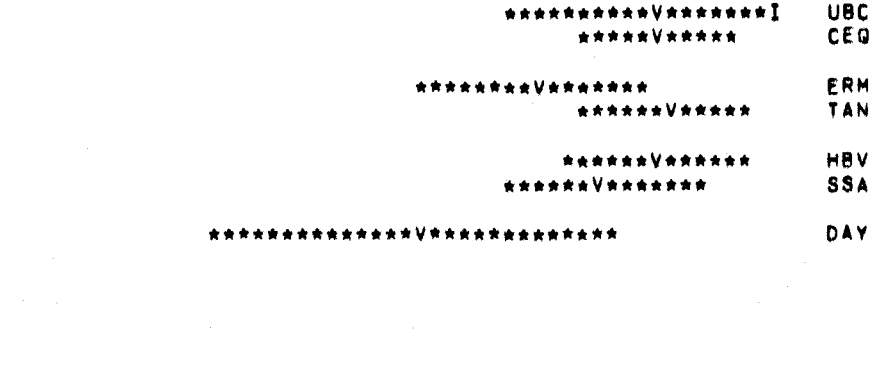


SNOWMELT SEASON

CALIBRATION PERIOD



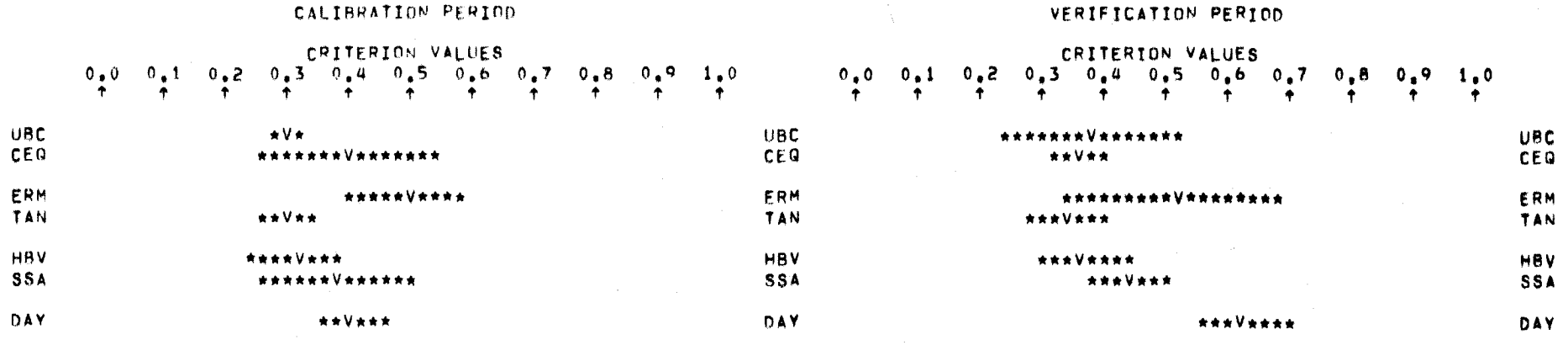
VERIFICATION PERIOD



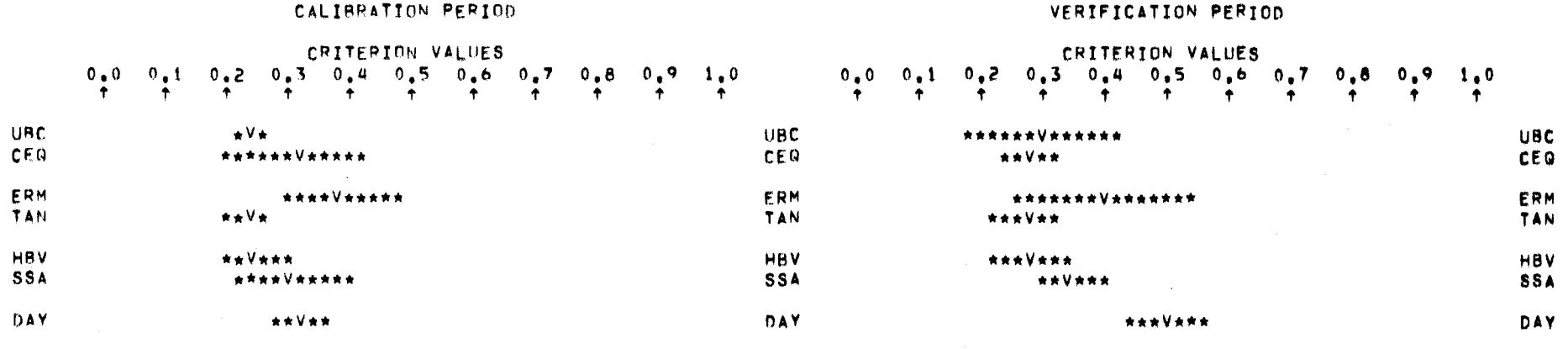
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR



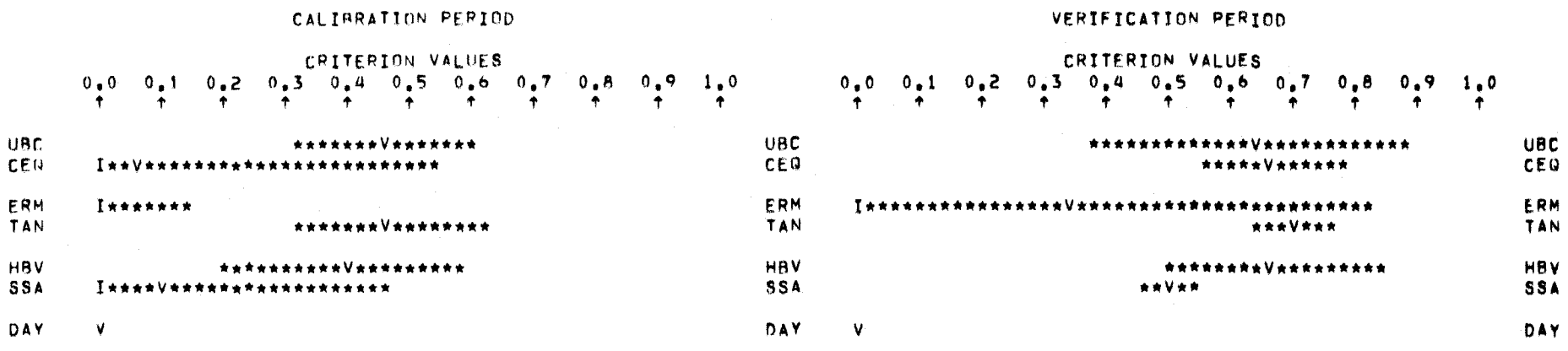
SNOWMELT SEASON



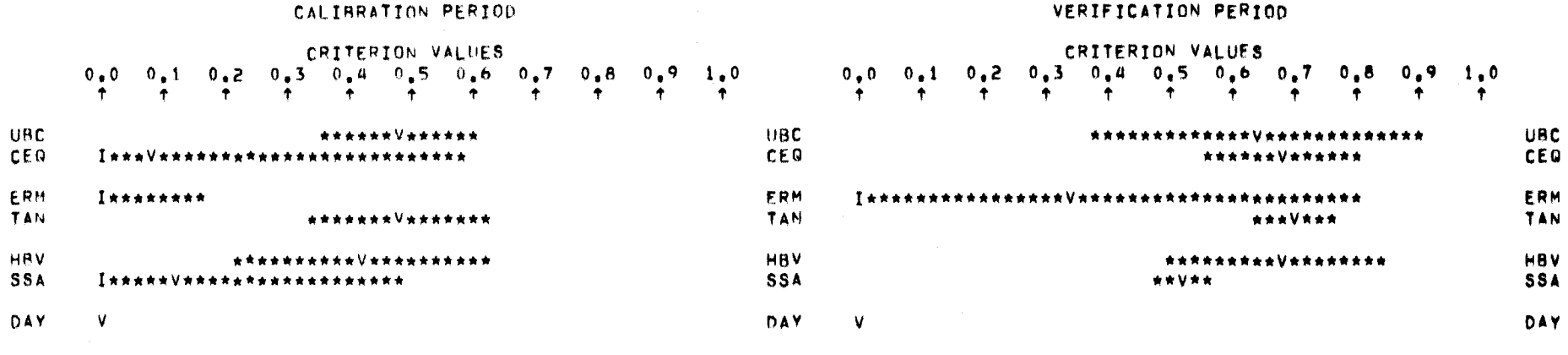
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR



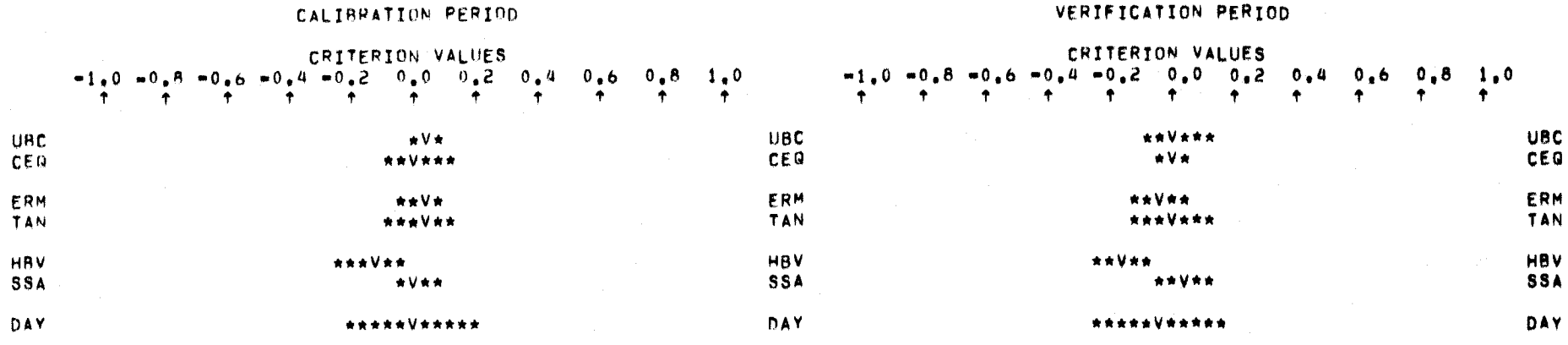
SNOWMELT SEASON



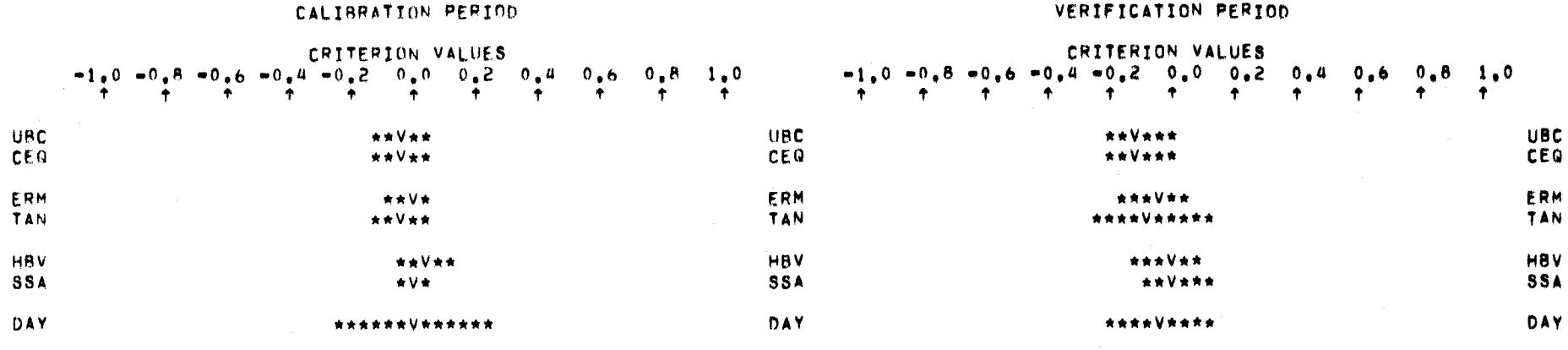
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION R
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR



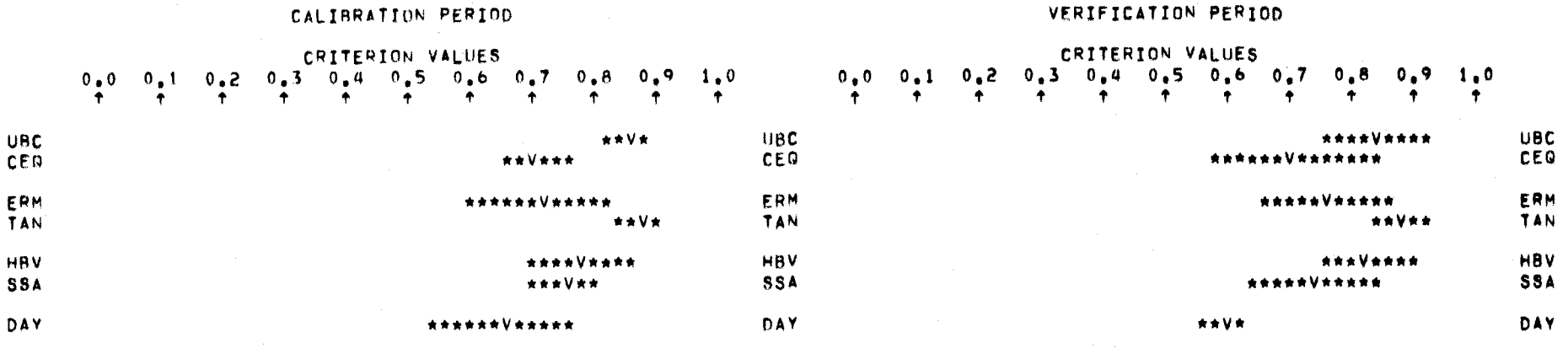
SNOWMELT SEASON



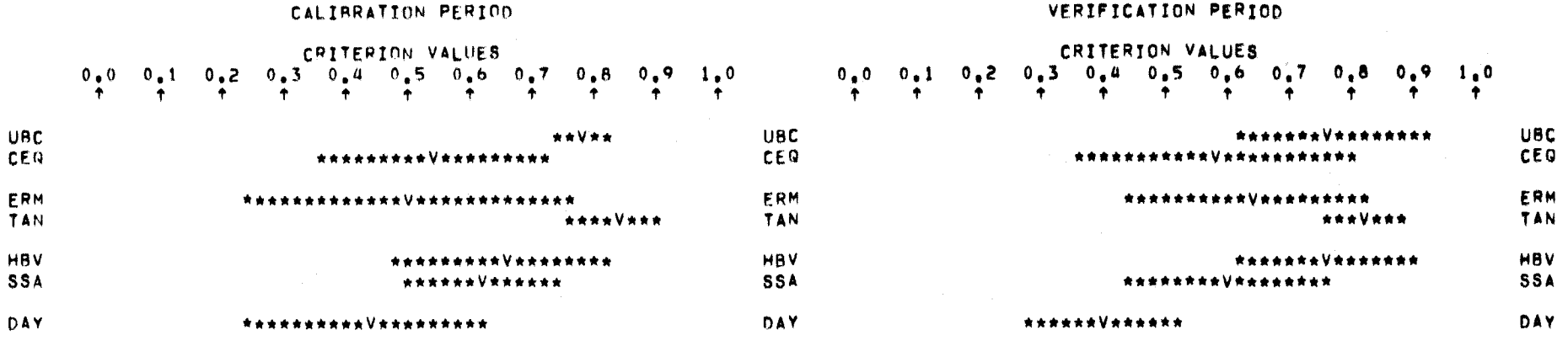
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR



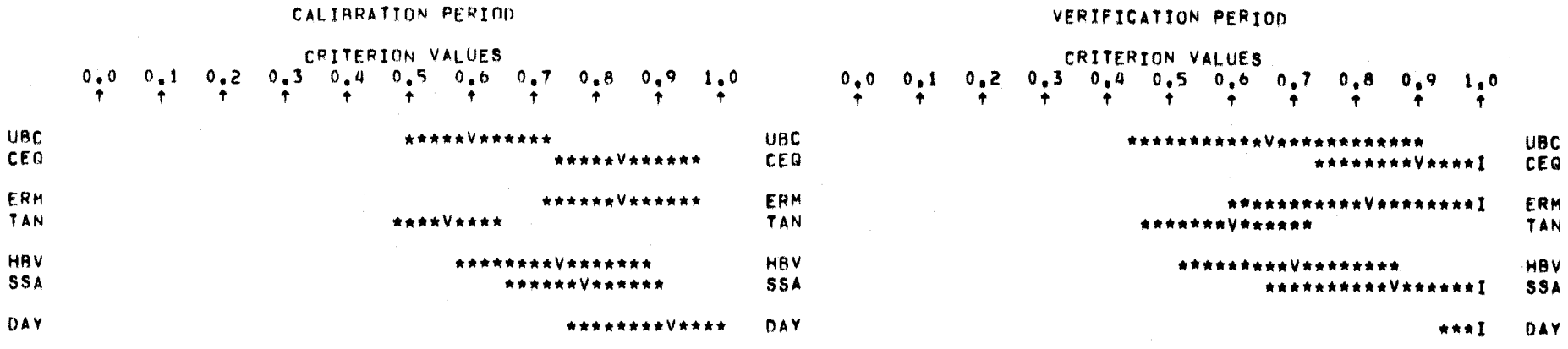
SNOWMELT SEASON



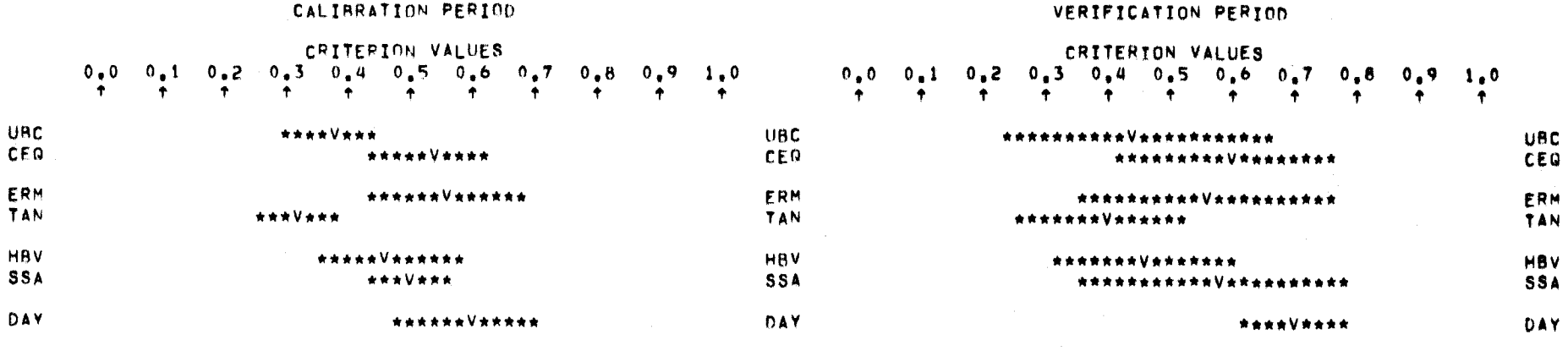
95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

CRITERION S
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR



SNOWMELT SEASON

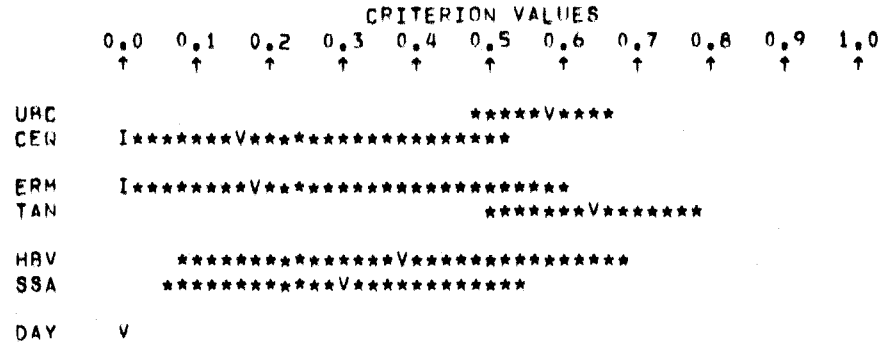


95% CONFIDENCE INTERVALS BASED ON JACKKNIFE STATISTIC

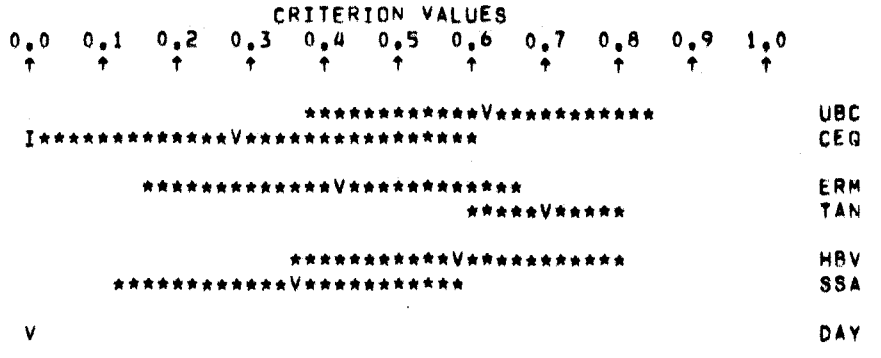
CRITERION NS
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

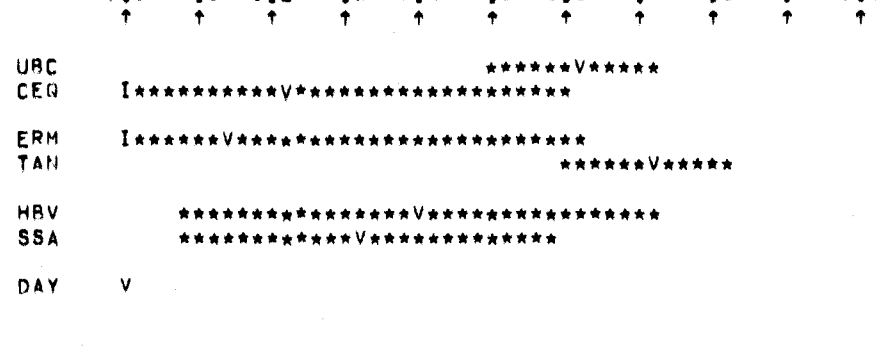


VERIFICATION PERIOD

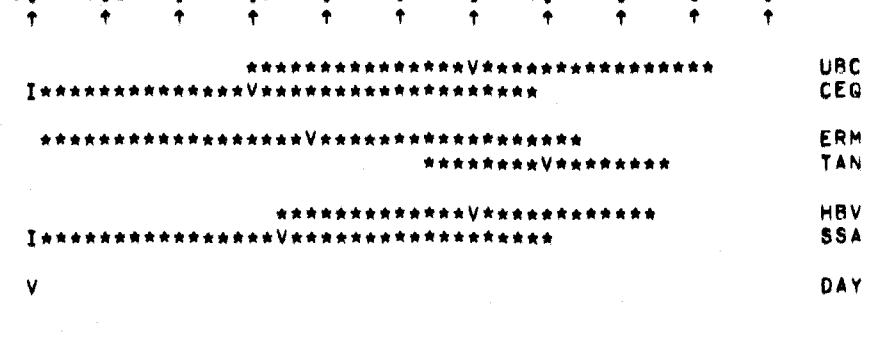


SNOWMELT SEASON

CALIBRATION PERIOD



VERIFICATION PERIOD



APPENDIX E

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	NAM	ERM	NWS	TAN	CEQ	SSA	UBC	DAY	HBV	PRM
PRM	*	*	*	*	*	*	*	*	*	0
HBV	*	*	*	*	*	*	*	*	0	
DAY	*	*	*	*	*	*	*	0		
UBC	*	*	*	*	*	*	0			
SSA	*	*	*	*	*	0				
CEQ	*	*	*	*	0					
TAN	*	*	*	0						
NWS			0							
ERM	*	0								
NAM	0									

VERIFICATION PERIOD

	DAY	ERM	NAM	PRM	CEQ	TAN	HBV	NWS	UBC	SSA	SRM
SRM				*	*	*	*	*	*	*	0
SSA				*	*	*	*	*	*	0	
UBC			*	*	*	*	*	*	0		
NWS				*	*	*	*	0			
HBV			*	*	*	*	0				
TAN						0					
CEQ				*	0						
PRM			*	0							
NAM			0								
ERM	*	0									
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	ERM	PRM	NWS	TAN	SSA	CEQ	UBC	HBV	NAM	DAY
DAY	*	*	*	*	*	*	*	*	*	0
NAM			*	*	*	*	*	*	0	
HBV	*	*	*	*	*	*	*	0		
UBC		*	*	*	*	*	0			
CEQ			*	*	*	0				
SSA		*	*	*	0					
TAN			*	0						
NWS			0							
PRM	*	0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	TAN	CEQ	SRM	PRM	UBC	SSA	NWS	HBV	NAM
NAM			*	*	*	*	*	*	*	*	0
HBV			*	*	*	*	*	*	*	0	
NWS				*	*	*	*	*	0		
SSA			*	*	*	*	*	0			
UBC						*	0				
PRM	*	*	*	*	*	0					
SRM			*	*	0						
CEQ			*	0							
TAN			0								
ERM	*	0									
DAY	0										

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	PRM	CEQ	HBV	TAN	NAM	SSA	UBC	NWS
NWS						*	*	*	*	0
UBC						*	*	*	0	
SSA						*	*	0		
NAM					*	*	0			
TAN				*	*	0				
HBV		*	*	*	0					
CEQ	*	*	*	0						
PRM	*	*	0							
DAY	*	0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	NAM	SRM	UBC	SSA	CEQ	TAN	HBV	NWS
NWS											0
HBV				*	*	*	*	*	*	0	
TAN				*	*	*	*	*	0		
CEQ				*	*	*	*	0			
SSA				*	*	*	0				
UBC			*	*	*	0					
SRM				*	0						
NAM				0							
PRM	*	*	0								
FRM	*	0									
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	PRM	HBV	CEQ	SSA	TAN	UBC	NWS	NAM
NAM						*	*	*	*	0
NWS						*	*	*	0	
UBC						*	*	0		
TAN					*	*	0			
SSA						0				
CEQ	*	*	*	*	0					
HBV	*	*	*	0						
PRM	*	*	0							
ERM	*	0								
DAY	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	SSA	UBC	TAN	SRM	HBV	CEQ	NAM	NWS
NWS							*	*	*	*	0
NAM							*	*	*	0	
CEQ						*	*	*	0		
HBV				*	*	*	*	0			
SRM			*	*	*	*	0				
TAN			*	*	*	0					
UBC			*	*	0						
SSA			*	0							
PRM			0								
ERM	*	0									
DAY	0										

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	PRM	CEQ	HBV	TAN	NAM	SSA	UBC	NWS
NWS						*	*	*	*	0
UBC						*	*	*	0	
SSA						*	*	0		
NAM					*	*	0			
TAN			*	*	*	0				
HBV	*	*	*	*	0					
CEQ	*	*	*	0						
PRM	*	*	0							
DAY	*	0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	NAM	SRM	UBC	SSA	TAN	CEQ	HBV	NWS
NWS							*	*	*	*	0
HBV				*	*	*	*	*	*	0	
CEQ				*	*	*	*	*	0		
TAN				*	*	*	*	0			
SSA				*	*	*	0				
UBC			*	*	*	0					
SRM				*	0						
NAM				0							
PRM	*	*	0								
ERM	*	0									
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	PRM	HBV	CEQ	SSA	TAN	UBC	NWS	NAM
NAM						*	*	*	*	0
NWS						*	*	*	0	
UBC						*	*	0		
TAN				*	*	*	0			
SSA						0				
CEQ	*	*	*	*	0					
HBV	*	*	*	0						
PRM	*	*	0							
ERM	*	0								
DAY	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	SSA	UBC	TAN	SRM	HBV	CEQ	NAM	NWS
NWS				*	*	*	*	*	*	*	0
NAM				*	*	*	*	*	*	0	
CEQ			*	*	*	*	*	*	0		
HBV							*	0			
SRM			*	*	*	*	0				
TAN		*	*	*	*	0					
UBC			*	*	0						
SSA		*	*	0							
PRM		*	0								
ERM	*	0									
DAY	0										

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DURANCE RIVER (FRANCE)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	PRM	CEQ	HBV	TAN	NAM	SSA	UBC	NWS
NWS						*	*	*	*	0
UBC						*	*	*	0	
SSA						*	*	0		
NAM						*	0			
TAN					*	0				
HBV		*	*	*	0					
CEQ		*	*	0						
PRM		*	0							
DAY		0								
ERM	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	NAM	UBC	SRM	SSA	TAN	CEQ	HBV	NWS
NWS										*	0
HBV				*	*	*	*	*	*	0	
CEQ				*	*	*	*	*	0		
TAN				*	*	*	*	0			
SSA				*	*	*	0				
SRM				*	*	0					
UBC				*	0						
NAM				0							
PRM		*	0								
ERM	*	0									
DAY	0										

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	PRM	HBV	CEQ	SSA	TAN	UBC	NWS	NAM
NAM							*	*	*	0
NWS						*	*	*	0	
UBC						*	*	0		
TAN						*	0			
SSA					*	0				
CEQ	*	*	*	*	0					
HBV	*	*	*	0						
PRM	*	*	0							
ERM	*	0								
DAY	0									

VERIFICATION PERIOD

	DAY	ERM	PRM	SSA	UBC	TAN	SRM	HBV	CEQ	NAM	NWS
NWS							*	*	*	*	0
NAM							*	*	*	0	
CEQ						*	*	*	0		
HBV					*	*	*	0			
SRM				*	*	*	*	0			
TAN				*	*	*	0				
UBC				*	0						
SSA				*	0						
PRM				0							
ERM	*	0									
DAY	0										

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION R
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	NAM	SRM	HBV	PRM	DAY	TAN	UBC	SSA	CEQ	NWS
NWS					*	*	*	*	*	0
CEQ				*	*	*	*	*	0	
SSA					*	*	*	0		
UBC					*	*	0			
TAN					*	0				
DAY	*	*	*	*	0					
PRM		*		0						
HBV			0							
SRM		0								
NAM	0									

VERIFICATION PERIOD

	SRM	HBV	NAM	UBC	TAN	CEQ	NWS	PRM	DAY	SSA
SSA		*	*	*	*	*	*	*	*	0
DAY	*	*	*	*	*	*	*	*	0	
PRM				*	*	*	*	0		
NWS				*		*	0			
CEQ		*	*	*	*	0				
TAN				*	0					
UBC		*	*	0						
NAM		*	0							
HBV		0								
SRM	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	PRM	NAM	UBC	SRM	SSA	CEQ	HBV	DAY	NWS	TAN
TAN				*	*	*	*	*	*	0
NWS		*	*	*	*	*	*	*	0	
DAY	*	*	*	*	*	*	*	0		
HBV		*	*	*	*	*	0			
CEQ			*	*	*	0				
SSA			*	*	0					
SRM	*	*	*	0						
UBC	*	*	0							
NAM	*	0								
PRM	0									

VERIFICATION PERIOD

	DAY	NAM	SRM	PRM	SSA	CEQ	TAN	HBV	NWS	UBC
UBC	*	*	*	*	*	*	*	*	*	0
NWS	*	*	*	*	*	*	*	*	0	
HBV	*	*	*	*	*	*	*	0		
TAN	*	*	*	*	*	*	0			
CEQ	*		*	*	*	0				
SSA	*	*	*	*	0					
PRM		*	*	0						
SRM		*	0							
NAM		0								
DAY	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	CEQ	SRM	NAM	PRM	HBV	SSA	UBC	TAN	NWS
NWS									*	0
TAN								*	0	
UBC						*	*	0		
SSA			*	*	*	*	0			
HBV			*	*	*	0				
PRM			*	*	0					
NAM			*	0						
SRM			0							
CEQ		0								
DAY	0									

VERIFICATION PERIOD

	DAY	CEQ	SRM	HBV	UBC	SSA	NAM	PRM	TAN	NWS
NWS										0
TAN						*	*	*	0	
PRM							*	0		
NAM				*	*	*	0			
SSA			*	*	*	0				
UBC				*	0					
HBV			*	0						
SRM		*	0							
CEQ		0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	CEQ	PRM	SSA	SRM	NAM	HBV	TAN	UBC	NWS
NWS							*	*	*	0
UBC				*	*	*	*	*	0	
TAN		*	*	*	*	*	*	0		
HBV		*	*	*	*	*	0			
NAM		*	*	*	*	0				
SRM		*	*	*	0					
SSA		*	*	0						
PRM		*	0							
CEQ		0								
DAY	0									

VERIFICATION PERIOD

	DAY	CEQ	SSA	UBC	TAN	HBV	SRM	NAM	PRM	NWS
NWS								*	*	0
PRM				*	*	*	*	*	0	
NAM				*	*	*	*	0		
SRM				*	*	*	0			
HBV				*	*	0				
TAN			*	*	0					
UBC		*	*	0						
SSA			0							
CEQ	*	0								
DAY	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION S
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	CEQ	SRM	NAM	PRM	SSA	HBV	UBC	TAN	NWS
NWS									*	0
TAN								*	0	
UBC						*	*	0		
HBV			*	*	*	*	0			
SSA			*	*	*	0				
PRM			*	*	0					
NAM			*	0						
SRM			0							
CEQ		0								
DAY	0									

VERIFICATION PERIOD

	DAY	CEQ	SRM	HBV	UBC	SSA	NAM	PRM	TAN	NWS
NWS										0
TAN			*	*	*	*	*	*	0	
PRM							*	0		
NAM			*	*	*	*	0			
SSA			*	*	*	0				
UBC			*	0						
HBV		*	*	0						
SRM		*	0							
CEQ	*	0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	CEQ	PRM	SSA	NAM	SRM	HBV	TAN	UBC	NWS
NWS								*	*	0
UBC								*	0	
TAN		*	*	*	*	*	*	0		
HBV		*	*	*	*	*	0			
SRM			*	*	*	0				
NAM		*	*	*	0					
SSA		*	*	0						
PRM		*	0							
CEQ		0								
DAY	0									

VERIFICATION PERIOD

	DAY	CEQ	SSA	UBC	TAN	HBV	SRM	NAM	PRM	NWS
NWS										0
PRM						*	*	*	0	
NAM			*	*	*	*	*	0		
SRM			*	*	*	*	0			
HBV			*	*	*	0				
TAN			*	*	0					
UBC			*	0						
SSA		*	0							
CEQ	*	0								
DAY	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT W3 = WATERSHED (USA)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	CEQ	SRM	NAM	PRM	HBV	SSA	UBC	TAN	NWS
NWS									*	0
TAN						*	*	*	0	
UBC				*	*	*	*	0		
SSA			*	*	*	*	0			
HBV			*	*	*	0				
PRM		*	*	*	0					
NAM			*	0						
SRM			0							
CEQ		0								
DAY	0									

VERIFICATION PERIOD

	DAY	CEQ	SRM	UBC	HBV	SSA	NAM	PRM	TAN	NWS
NWS										0
TAN				*	*	*	*	*	0	
PRM				*	*	*	*	0		
NAM			*	*	*	*	0			
SSA		*	*	*	*	0				
HBV		*	*	*	0					
UBC		*	*	0						
SRM		*	0							
CEQ	*	0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	CEQ	PRM	SSA	SRM	NAM	HBV	TAN	UBC	NWS
NWS								*	*	0
UBC						*	*	*	0	
TAN		*	*	*	*	*	*	0		
HBV		*	*	*	*	*	0			
NAM		*	*	*	*	0				
SRM		*	*	*	0					
SSA		*	*	0						
PRM		*	0							
CEQ		0								
DAY	0									

VERIFICATION PERIOD

	DAY	CEQ	SSA	UBC	TAN	SRM	HBV	NAM	PRM	NWS
NWS							*	*	*	0
PRM				*	*	*	*	*	0	
NAM			*	*	*	*	*	0		
HBV		*	*	*	*	*	0			
SRM			*	*	*	0				
TAN		*	*	*	0					
UBC		*	*	0						
SSA		*	0							
CEQ	*	0								
DAY	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	NAM	TAN	UBC	HBV	CEQ	PRM	DAY	NWS	SSA
SSA	*	*	*	*	*	*	*	*	*	0
NWS	*	*	*	*	*	*	*	*	0	
DAY	*	*	*	*	*	*	*	0		
PRM	*	*	*	*	*	*	0			
CEQ	*	*	*	*	*	0				
HBV	*	*	*	*	0					
UBC	*	*	*	0						
TAN	*	*	0							
NAM	*	0								
ERM	0									

VERIFICATION PERIOD

	NAM	UBC	TAN	DAY	SSA	HBV	ERM	CEQ	NWS	PRM
PRM		*	*	*	*	*	*	*	*	0
NWS	*	*	*	*	*	*	*	*	0	
CEQ		*	*	*	*	*	*	0		
ERM		*	*	*	*	*	0			
HBV	*	*	*	*	*	0				
SSA	*	*	*	*	0					
DAY	*	*	*	0						
TAN			0							
UBC		0								
NAM	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	SSA	NAM	TAN	PRM	ERM	CEQ	NWS	UBC	DAY	HBV
HBV		*	*	*	*	*	*	*	*	0
DAY	*	*	*	*	*	*	*	*	0	
UBC	*	*	*	*	*	*	*	0		
NWS		*	*	*	*	*	0			
CEQ	*	*	*	*	*	0				
ERM	*	*	*	*	0					
PRM	*			0						
TAN		*	0							
NAM	*	0								
SSA	0									

VERIFICATION PERIOD

	NAM	SSA	DAY	PRM	CEQ	TAN	UBC	NWS	ERM	HBV
HBV		*	*	*	*	*	*	*	*	0
ERM		*	*	*	*	*	*	*	0	
NWS						*		0		
UBC		*	*	*	*		0			
TAN						0				
CEQ		*	*	*	0					
PRM		*	*	0						
DAY	*	*	0							
SSA		0								
NAM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	SSA	NAM	CEQ	ERM	UBC	HBV	TAN	PRM	NWS
NWS							*	*	*	0
PRM					*	*	*	*	0	
TAN						*	*	0		
HBV					*	*	0			
UBC			*	*	*	0				
ERM			*	*	0					
CEQ		*	*	0						
NAM		*	0							
SSA		0								
DAY	0									

VERIFICATION PERIOD

	DAY	SSA	ERM	NAM	HBV	CEQ	UBC	TAN	PRM	NWS
NWS			*	*	*	*	*	*	*	0
PRM		*	*	*	*	*	*	*	0	
TAN			*	*	*	*	*	0		
UBC		*	*	*	*	*	0			
CEQ		*	*	*	*	0				
HBV				*	0					
NAM		*	*	0						
ERM	*	*	0							
SSA		0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	NAM	DAY	ERM	SSA	UBC	TAN	PRM	CEQ	HBV	NWS
NWS			*	*	*	*	*	*	*	0
HBV			*	*	*	*	*	*	0	
CEQ			*	*	*	*	*	0		
PRM			*	*	*	*	0			
TAN		*	*	*	*	0				
UBC			*	*	0					
SSA			*	0						
ERM		*	0							
DAY		0								
NAM	0									

VERIFICATION PERIOD

	ERM	DAY	NAM	SSA	UBC	CEQ	HBV	PRM	NWS	TAN
TAN							*	*	*	0
NWS				*	*	*	*	*	0	
PRM				*	*	*	*	0		
HBV				*	*	*	0			
CEQ			*	*	*	0				
UBC				*	0					
SSA				0						
NAM			*	0						
DAY	*	0								
ERM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	SSA	NAM	CEQ	ERM	UBC	HBV	TAN	PRM	NWS
NWS										0
PRM						*	*	*	0	
TAN							*	0		
HBV						*	0			
UBC			*	*	*	0				
ERM			*	*	0					
CEQ		*	*	0						
NAM		*	0							
SSA	*	0								
DAY	0									

VERIFICATION PERIOD

	DAY	ERM	SSA	NAM	UBC	CEQ	HBV	TAN	PRM	NWS
NWS						*	*	*	*	0
PRM					*	*	*	*	0	
TAN					*	*	*	0		
HBV		*	*	*	*	*	0			
CEQ			*	*	*	0				
UBC				*	0					
NAM		*	*	0						
SSA	*	*	0							
ERM		0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	NAM	DAY	ERM	TAN	SSA	UBC	PRM	CEQ	HBV	NWS
NWS									*	0
HBV		*	*	*	*	*	*	*	0	
CEQ			*	*	*	*	*	0		
PRM				*	*	*	0			
UBC		*	*	*	*	0				
SSA		*	*	*	0					
TAN			*	0						
ERM		*	0							
DAY		0								
NAM	0									

VERIFICATION PERIOD

	ERM	DAY	NAM	SSA	CEQ	UBC	HBV	PRM	NWS	TAN
TAN				*	*	*	*	*	*	0
NWS							*	*	0	
PRM				*	*	*	*	0		
HBV				*	*	*	0			
UBC		*	*	*	*	0				
CEQ				*	0					
SSA			*	0						
NAM		*	0							
DAY		0								
ERM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DUNAJEC RIVER (POLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	SSA	NAM	CEQ	ERM	UBC	HBV	TAN	PRM	NWS
NWS							*	*	*	0
PRM						*	*	*	0	
TAN						*	*	0		
HBV					*	*	0			
UBC			*	*	*	0				
ERM			*	*	0					
CEQ		*	*	0						
NAM		*	0							
SSA		0								
DAY	0									

VERIFICATION PERIOD

	DAY	SSA	ERM	NAM	HBV	CEQ	UBC	TAN	PRM	NWS
NWS				*	*	*	*	*	*	0
PRM				*	*	*	*	*	0	
TAN				*	*	*	*	0		
UBC		*	*	*	*	*	0			
CEQ				*	*	0				
HBV				*	0					
NAM				0						
ERM	*	*	0							
SSA		0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	NAM	DAY	ERM	SSA	TAN	UBC	PRM	CEQ	HBV	NWS
NWS				*	*	*	*	*	*	0
HBV			*	*	*	*	*	*	0	
CEQ			*	*	*	*	*	0		
PRM			*	*	*	*	0			
UBC			*	*	*	0				
TAN		*	*	*	0					
SSA			*	0						
ERM		*	0							
DAY		0								
NAM	0									

VERIFICATION PERIOD

	ERM	DAY	NAM	SSA	CEQ	UBC	HBV	PRM	NWS	TAN
TAN							*	*	*	0
NWS				*	*	*	*	*	0	
PRM							*	0		
HBV				*	*	*	0			
UBC			*	*	*	0				
CEQ				*	0					
SSA				0						
NAM		*	0							
DAY		0								
ERM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION R
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	NAM	HBV	SRM	PRM	TAN	UBC	SSA	DAY	CEQ
CEQ	*	*	*	*	*	*	*	*	*	0
DAY	*	*	*	*	*	*	*	*	0	
SSA		*	*	*	*	*	*	0		
UBC	*	*	*	*	*	*	0			
TAN	*	*	*	*	*	0				
PRM	*	*	*	*	0					
SRM	*	*		0						
HBV			0							
NAM	*	0								
ERM	0									

VERIFICATION PERIOD

	ERM	NAM	UBC	SRM	CEQ	SSA	TAN	HBV	PRM	DAY
DAY	*	*	*	*	*	*	*	*	*	0
PRM		*	*	*	*	*	*	*	0	
HBV		*	*	*	*	*	*	0		
TAN		*	*	*	*	*	0			
SSA	*	*	*	*	*	0				
CEQ	*	*	*	*	0					
SRM	*	*	*	0						
UBC	*	*	0							
NAM	*	0								
ERM	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	ERM	UBC	NAM	PRM	SSA	CEQ	DAY	TAN	SRM	HBV
HBV	*	*	*	*	*	*	*	*	*	0
SRM				*	*	*	*	*	0	
TAN		*	*	*	*	*	*	0		
DAY	*	*	*	*	*	*	0			
CEQ		*	*	*	*	0				
SSA				*	0					
PRM	*	*	*	0						
NAM	*	*	0							
UBC	*	0								
ERM	0									

VERIFICATION PERIOD

	ERM	UBC	NAM	DAY	CEQ	PRM	TAN	HBV	SSA	SRM
SRM										0
SSA	*	*	*	*	*	*	*	*	0	
HBV	*	*	*	*	*	*	*	0		
TAN		*	*		*	*	0			
PRM	*	*	*	*	*	0				
CEQ		*	*		0					
DAY	*	*	*	0						
NAM	*	*	0							
UBC	*	0								
ERM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	HBV	DAY	CEQ	ERM	PRM	NAM	SSA	TAN	SRM	UBC
UBC						*	*	*	*	0
SRM						*	*	*	0	
TAN						*	*	0		
SSA				*	*	*	0			
NAM			*	*	*	0				
PRM				*	0					
ERM			*	0						
CEQ		*	0							
DAY	*	0								
HBV	0									

VERIFICATION PERIOD

	PRM	DAY	HBV	ERM	SSA	NAM	CEQ	SRM	UBC	TAN
TAN					*	*	*	*	*	0
UBC					*	*	*	*	0	
SRM					*	*	*	0		
CEQ	*	*	*	*	*	*	0			
NAM	*	*	*	*	*	0				
SSA					0					
ERM	*	*	*	0						
HBV	*	*	0							
DAY	*	0								
PRM	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	HBV	ERM	PRM	CEQ	SSA	NAM	TAN	SRM	UBC
UBC						*	*	*	*	0
SRM						*	*	*	0	
TAN						*	*	0		
NAM					*	*	0			
SSA			*	*	*	0				
CEQ				*	0					
PRM			*	0						
ERM	*	*	0							
HBV	*	0								
DAY	0									

VERIFICATION PERIOD

	PRM	DAY	ERM	HBV	SSA	SRM	NAM	UBC	CEQ	TAN
TAN						*	*	*	*	0
CEQ					*	*	*	*	0	
UBC					*	*	*	0		
NAM				*	*	*	0			
SRM					*	0				
SSA					0					
HBV		*	*	0						
ERM	*	*	0							
DAY	*	0								
PRM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION S
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	HBV	DAY	CEQ	ERM	PRM	NAM	SSA	TAN	SRM	UBC
UBC							*	*	*	0
SRM							*	*	0	
TAN							*	0		
SSA					*	*	0			
NAM				*	*	0				
PRM			*	*	0					
ERM			*	0						
CEQ		*	0							
DAY	*	0								
HBV	0									

VERIFICATION PERIOD

	PRM	DAY	ERM	HBV	NAM	CEQ	SSA	SRM	UBC	TAN
TAN					*	*	*	*	*	0
UBC					*	*	*	*	0	
SRM					*	*	*	0		
SSA					*	*	0			
CEQ	*	*	*	*	*	0				
NAM	*	*	*	*	0					
HBV	*	*	*	0						
ERM	*	*	0							
DAY	*	0								
PRM	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	HBV	ERM	PRM	CEQ	SSA	NAM	TAN	SRM	UBC
UBC						*	*	*	*	0
SRM								*	0	
TAN						*	*	0		
NAM						*	0			
SSA				*	*	0				
CEQ			*	*	0					
PRM		*	*	0						
ERM	*	*	0							
HBV	*	0								
DAY	0									

VERIFICATION PERIOD

	PRM	DAY	ERM	HBV	SSA	SRM	NAM	UBC	CEQ	TAN
TAN						*	*	*	*	0
CEQ					*	*	*	*	0	
UBC					*	*	*	0		
NAM				*	*	*	0			
SRM						0				
SSA					0					
HBV	*	*	*	0						
ERM	*	*	0							
DAY	*	0								
PRM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT DISCHMA BASIN (SWITZERLAND)

COMPLETE YEAR

CALIBRATION PERIOD

	HBV	DAY	CEQ	ERM	PRM	NAM	SSA	TAN	SRM	UBC
UBC						*	*	*	*	0
SRM						*	*	*	0	
TAN						*	*	0		
SSA				*	*	*	0			
NAM			*	*	*	0				
PRM			*	*	0					
ERM			*	0						
CEQ	*	*	0							
DAY		0								
HBV	0									

VERIFICATION PERIOD

	DAY	PRM	ERM	HBV	NAM	CEQ	SSA	SRM	UBC	TAN
TAN								*	*	0
UBC					*	*	*	*	0	
SRM			*	*	*	*	*	0		
SSA		*	*	*	*	*	0			
CEQ					*	0				
NAM			*	*	0					
HBV	*	*	*	0						
ERM	*	*	0							
PRM	*	0								
DAY	0									

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	HBV	ERM	PRM	CEQ	SSA	NAM	TAN	SRM	UBC
UBC						*	*	*	*	0
SRM						*	*	*	0	
TAN						*	*	0		
NAM					*	*	0			
SSA			*	*	*	0				
CEQ				*	0					
PRM			*	0						
ERM		*	0							
HBV	*	0								
DAY	0									

VERIFICATION PERIOD

	PRM	DAY	ERM	HBV	SSA	SRM	NAM	CEQ	UBC	TAN
TAN						*	*	*	*	0
UBC					*	*	*	*	0	
CEQ					*	*	*	0		
NAM				*	*	*	0			
SRM				*	*	0				
SSA			*	*	0					
HBV	*	*	*	0						
ERM	*	*	0							
DAY		0								
PRM	0									

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION R
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	SSA	TAN	CEQ	UBC	HBV	DAY
DAY	*	*	*	*	*	*	0
HBV		*	*	*	*	0	
UBC		*	*	*	0		
CEQ		*	*	0			
TAN		*	0				
SSA		0					
ERM	0						

VERIFICATION PERIOD

	ERM	TAN	SSA	HBV	UBC	CEQ	DAY
DAY	*	*	*	*	*	*	0
CEQ		*	*	*	*	0	
UBC		*	*	*	0		
HBV		*	*	0			
SSA		*	0				
TAN		0					
ERM	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	ERM	UBC	TAN	CEQ	HBV	DAY	SSA
SSA		*	*	*	*	*	0
DAY	*	*	*	*	*	0	
HBV		*	*	*	0		
CEQ		*	*	0			
TAN		*	0				
UBC		0					
ERM	0						

VERIFICATION PERIOD

	ERM	TAN	UBC	SSA	HBV	CEQ	DAY
DAY	*	*	*	*	*	*	0
CEQ					*	0	
HBV		*	*	*	0		
SSA		*	*	0			
UBC		*	0				
TAN		0					
ERM	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	CEQ	SSA	HBV	UBC	TAN
TAN					*	*	0
UBC						0	
HBV					0		
SSA		*	*	0			
CEQ	*	*	0				
DAY		0					
ERM	0						

VERIFICATION PERIOD

	DAY	ERM	SSA	UBC	HBV	CEQ	TAN
TAN				*	*	*	0
CEQ			*	*	*	0	
HBV			*	*	0		
UBC		*	*	0			
SSA		*	0				
ERM	*	0					
DAY	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	ERM	DAY	CEQ	SSA	HBV	UBC	TAN
TAN					*	*	0
UBC					*	0	
HBV					0		
SSA		*	*	0			
CEQ	*	*	0				
DAY		0					
ERM	0						

VERIFICATION PERIOD

	DAY	ERM	SSA	UBC	HBV	CEQ	TAN
TAN			*	*	*	*	0
CEQ			*	*	*	0	
HBV			*	*	0		
UBC		*	*	0			
SSA		*	0				
ERM		0					
DAY	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION S
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	CEQ	SSA	HBV	UBC	TAN
TAN					*	*	0
UBC					*	0	
HBV				*	0		
SSA	*	*	*	0			
CEQ	*	*	0				
DAY		0					
ERM	0						

VERIFICATION PERIOD

	DAY	ERM	SSA	UBC	HBV	CEQ	TAN
TAN				*	*	*	0
CEQ				*	*	0	
HBV				*	0		
UBC		*	*	0			
SSA			0				
ERM	*	0					
DAY	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	ERM	DAY	CEQ	SSA	HBV	UBC	TAN
TAN					*	*	0
UBC					*	0	
HBV				*	0		
SSA	*	*	*	0			
CEQ	*	*	0				
DAY		0					
ERM	0						

VERIFICATION PERIOD

	DAY	ERM	SSA	UBC	HBV	CEQ	TAN
TAN				*	*	*	0
CEQ				*	*	0	
HBV				*	0		
UBC		*	*	0			
SSA			0				
ERM	*	0					
DAY	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT ILLECILLEWAET RIVER (CANADA)

COMPLETE YEAR

CALIBRATION PERIOD

	ERM	DAY	CEQ	SSA	HBV	UBC	TAN
TAN					*	*	0
UBC					*	0	
HBV					0		
SSA		*	*	0			
CEQ		*	0				
DAY		0					
ERM	0						

VERIFICATION PERIOD

	DAY	ERM	SSA	UBC	HBV	CEQ	TAN
TAN					*	*	0
CEQ				*	*	0	
HBV			*	*	0		
UBC			*	0			
SSA			0				
ERM	*	0					
DAY	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	ERM	DAY	CEQ	SSA	HBV	UBC	TAN
TAN					*	*	0
UBC					*	0	
HBV					0		
SSA		*	*	0			
CEQ	*	*	0				
DAY		0					
ERM	0						

VERIFICATION PERIOD

	DAY	ERM	SSA	UBC	HBV	CEQ	TAN
TAN				*	*	*	0
CEQ				*	*	0	
HBV			*	*	0		
UBC			*	0			
SSA			0				
ERM	*	0					
DAY	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION R
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	HBV	UBC	TAN	ERM	CEQ	SSA	DAY
DAY	*	*	*	*	*	*	0
SSA		*	*	*	*	0	
CEQ		*	*	*	0		
ERM		*	*	0			
TAN		*	0				
UBC		0					
HBV	0						

VERIFICATION PERIOD

	HBV	SSA	DAY	ERM	UBC	CEQ	TAN
TAN		*	*	*	*	*	0
CEQ		*	*	*	*	0	
UBC		*	*	*	0		
ERM		*	*	0			
DAY	*	*	0				
SSA		0					
HBV	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	UBC	CEQ	TAN	HBV	DAY	ERM	SSA
SSA	*	*	*	*	*	*	0
ERM	*	*	*	*	*	0	
DAY	*	*	*	*	0		
HBV	*	*	*	0			
TAN	*	*	0				
CEQ	*	0					
UBC	0						

VERIFICATION PERIOD

	CEQ	UBC	TAN	ERM	DAY	HBV	SSA
SSA			*	*	*	*	0
HBV	*	*	*	*	*	0	
DAY	*	*	*	*	0		
ERM	*	*	*	0			
TAN	*	*	0				
UBC	*	0					
CEQ	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NTD
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	CEQ	ERM	SSA	HBV	UBC	TAN
TAN						*	0
UBC						0	
HBV		*	*	*	0		
SSA		*	*	0			
ERM	*	*	0				
CEQ	*	0					
DAY	0						

VERIFICATION PERIOD

	DAY	CEQ	SSA	ERM	HBV	UBC	TAN
TAN						*	0
UBC				*	*	0	
HBV				*	0		
ERM		*	*	0			
SSA		*	0				
CEQ	*	0					
DAY	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	CEQ	SSA	HBV	UBC	TAN
TAN						*	0
UBC						0	
HBV		*	*	*	0		
SSA		*	*	0			
CEQ	*	*	0				
ERM	*	0					
DAY	0						

VERIFICATION PERIOD

	DAY	CEQ	SSA	ERM	HBV	UBC	TAN
TAN					*	*	0
UBC				*	*	0	
HBV				*	0		
ERM		*	*	0			
SSA		*	0				
CEQ	*	0					
DAY	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION S
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	CEQ	ERM	SSA	HBV	UBC	TAN
TAN						*	0
UBC						0	
HBV		*	*	*	0		
SSA		*	*	0			
ERM	*	*	0				
CEQ	*	0					
DAY	0						

VERIFICATION PERIOD

	DAY	CEQ	SSA	ERM	HBV	UBC	TAN
TAN					*	*	0
UBC			*	*	*	0	
HBV				*	0		
ERM		*	*	0			
SSA		*	0				
CEQ		0					
DAY	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	CEQ	SSA	HBV	UBC	TAN
TAN						*	0
UBC						0	
HBV		*	*	*	0		
SSA			*	0			
CEQ	*	*	0				
ERM	*	0					
DAY	0						

VERIFICATION PERIOD

	DAY	CEQ	SSA	ERM	HBV	UBC	TAN
TAN					*	*	0
UBC		*	*	*	*	0	
HBV		*	*	*	0		
ERM	*	*	*	0			
SSA	*	*	0				
CEQ	*	0					
DAY	0						

MODEL GROUPS BASED ON CONFIDENCE INTERVALS CALCULATED BY JACKKNIFE STATISTIC

CRITERION NS
CATCHMENT KULTSJON (SWEDEN)

COMPLETE YEAR

CALIBRATION PERIOD

	DAY	CEQ	ERM	SSA	HBV	UBC	TAN
TAN						*	0
UBC						0	
HBV		*	*	*	0		
SSA		*	*	0			
ERM	*	*	0				
CEQ	*	0					
DAY	0						

VERIFICATION PERIOD

	DAY	CEQ	SSA	ERM	HBV	UBC	TAN
TAN						*	0
UBC				*	*	0	
HBV				*	0		
ERM		*	*	0			
SSA		*	0				
CEQ	*	0					
DAY	0						

SNOWMELT SEASON

CALIBRATION PERIOD

	DAY	ERM	CEQ	SSA	HBV	UBC	TAN
TAN						*	0
UBC						0	
HBV		*	*	*	0		
SSA		*	*	0			
CEQ	*	*	0				
ERM	*	0					
DAY	0						

VERIFICATION PERIOD

	DAY	CEQ	SSA	ERM	HBV	UBC	TAN
TAN					*	*	0
UBC			*	*	*	0	
HBV			*	*	0		
ERM		*	*	0			
SSA	*	*	0				
CEQ	*	0					
DAY	0						