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COMPARATIVE VERIFICATION OF LOCAL AND GUIDANCE
SURFACE WIND FORECASTS--NO. 3

Gary M. Carter and George W. Hollenbaugh

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We have verified TDL's automated forecasts of surface wind for the months of October 1974 through March 1975. These forecasts were based on the cool season (October-March) regression equations described in National Weather Service (NWS) Technical Procedures Bulletin No. 98 (NWS, 1973a).

We conducted this verification study in conjunction with the NWS combined aviation/public weather verification system (NWS, 1973b). Scores for our objective guidance forecasts are presented here along with corresponding scores for local forecasts prepared at Weather Service Forecast Offices (WSFO's). Table 1 shows the 89 stations we used. The Technical Procedures Branch of the Office of Meteorology and Oceanography furnished us with the local forecasts.

Since the local forecasts were recorded as calm if the wind speed was expected to be less than 8 knots, the comparison was conducted in two ways. First, for all those cases where both the local and guidance wind speed forecasts were at least 8 knots, the mean absolute error (MAE) of speed was computed. Cases where the observed wind was calm were then eliminated from that sample and the MAE of direction was computed. Secondly, for all cases where both local and guidance forecasts were available, skill score, percent correct, and bias by category were computed from contingency tables of wind speed. In contrast to our earlier verification (Carter et. al, 1975), these tables had two new categories in order to obtain better resolution of the higher speed forecasts. The seven categories were; less than 8, 8-12, 13-17, 18-22, 23-27, 28-32, and greater than 32 knots. Tables 2-6 show the comparative verification scores for the 6-month period October 1974 through March 1975, while tables 7-11 show the corresponding contingency tables. Scores are given for three projections. These are 18, 30, and 42 hours for the guidance forecasts which were made from 0000 GMT data. However, the local forecasts were not released until 1000 GMT, so about 9 hours later data were available for their preparation. It should also be noted that our objective speed forecasts were enhanced by the method described in NWS Technical Procedures Bulletin No. 102 (NWS 1973c).

Statistics for all 89 stations combined are shown in Table 1. The MAE scores for direction reveal an advantage for guidance that increases from 3° at 18 hours to 8° at 42 hours. The mean error, skill score, and percent correct of speed forecasts are better for guidance at all three projections, but in general these scores do not exhibit the relative improvement of guidance with longer projections that is shown for the direction forecasts. The guidance forecasts are nearly unbiased in the mean; however, the individual biases by category from the contingency tables reveal a tendency to underforecast the higher wind speeds. The local forecasts are much better in this regard. This is similar to what we found in our previous verification of surface wind forecasts during the cool season (Carter, et. al., 1974).

Tables 2-6 and 7-11 show results for the NWS Eastern, Southern, Central, and Western Regions, respectively. Category two (8-12 knots) is overcast by the objective system for all three projections in each region, while the frequencies of occurrence of categories four (18-22 knots) through seven (greater than 32 knots) are underforecast.

Except for the 18-hr forecast for the Western Region (see Tables 6 and 11), all the MAE's, skill scores, and percents correct for TDL's objective guidance forecasts are better than those for the NWS local forecasts. However, our objective forecasts have undesirable bias characteristics. We believe that this aspect of our system has recently been improved by implementation of the inflation technique described in NWS Technical Procedures Bulletin No. 137 (NWS 1975). We first began using this technique to adjust our forecasts of wind speed in August 1975.

ACKNOWLEDGEMENT

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- NWS, 1973a: "Surface wind forecasts based on Model Output Statistics (MOS)--No. 3," Technical Procedures Bulletin, No. 98, 6 pp.
- NWS, 1973b: "Combined aviation/public weather forecast verification," National Weather Service Operations Manual, Chapter C-73, 15 pp.
- NWS, 1973c: "Surface wind forecasts based on Model Output Statistics (MOS)--No. 4," Technical Procedures Bulletin, No. 102, 4 pp.
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Table 1. Eighty-nine stations used for comparative verifications of guidance and local surface wind forecasts.

FWM	Portland, Maine	ABQ	Albuquerque, New Mexico
BTV	Burlington, Vermont	TCC	Tucumcari, New Mexico
CON	Concord, New Hampshire	SSM	Sault Ste Marie, Michigan
BOS	Boston, Massachusetts	DTW	Detroit, Michigan
PVD	Providence, Rhode Island	SBN	South Bend, Indiana
BUF	Buffalo, New York	IND	Indianapolis, Indiana
SYR	Syracuse, New York	LEX	Lexington, Kentucky
ALB	Albany, New York	SDF	Louisville, Kentucky
JFK	New York, New York	MSN	Madison, Wisconsin
ERI	Erie, Pennsylvania	MKE	Milwaukee, Wisconsin
PIT	Pittsburgh, Pennsylvania	ORD	Chicago, Illinois
PHL	Philadelphia, Pennsylvania	SPI	Springfield, Illinois
CLE	Cleveland, Ohio	STL	St. Louis, Missouri
CMH	Columbus, Ohio	MCI	Kansas City, Missouri
CRW	Charleston, West Virginia	TOP	Topeka, Kansas
DCA	Washington, D. C.	DDC	Dodge City, Kansas
ORF	Norfolk, Virginia	DEN	Denver, Colorado
RDU	Raleigh-Durham, North Carolina	GJT	Grand Junction, Colorado
CLT	Charlotte, North Carolina	SHR	Sheridan, Wyoming
CAE	Columbia, South Carolina	CYS	Cheyenne, Wyoming
CHS	Charleston, South Carolina	BIS	Bismarck, North Dakota
ATL	Atlanta, Georgia	FAR	Fargo, North Dakota
SAV	Savannah, Georgia	RAP	Rapid City, South Dakota
MIA	Miami, Florida	FSD	Sioux Falls, South Dakota
JAX	Jacksonville, Florida	BFF	Scottsbluff, Nebraska
BHM	Birmingham, Alabama	OMA	Omaha, Nebraska
MOB	Mobile, Alabama	MSP	Minneapolis, Minnesota
TYS	Knoxville, Tennessee	DSM	Des Moines, Iowa
MEM	Memphis, Tennessee	BRL	Burlington, Iowa
MEI	Meridian, Mississippi	INL	International Falls, Minnesota
JAN	Jackson, Mississippi	FLG	Flagstaff, Arizona
MSY	New Orleans, Louisiana	PHX	Phoenix, Arizona
SHV	Shreveport, Louisiana	SLC	Salt Lake City, Utah
IAH	Houston, Texas	RNO	Reno, Nevada
SAT	San Antonio, Texas	SAN	San Diego, California
DFW	Fort Worth, Texas	LAX	Los Angeles, California
ABI	Abilene, Texas	FAT	Fresno, California
LBB	Lubbock, Texas	SFO	San Francisco, California
ELP	El Paso, Texas	PDX	Portland, Oregon
LIT	Little Rock, Arkansas	PDT	Pendleton, Oregon
FSM	Fort Smith, Arkansas	SEA	Seattle, Washington
TUL	Tulsa, Oklahoma	GEG	Spokane, Washington
OKC	Oklahoma City, Oklahoma	BOI	Boise, Idaho
		PIH	Pocatello, Idaho
		MSO	Missoula, Montana
		GTF	Great Falls, Montana

Table 2. Verification of subjective local and objective guidance surface wind forecasts at 89 stations across the United States during October 1974 through March 1975.

FCST. PROJ (HRS)	TYPE OF FCST	DIRECTION		SPEED (KTS)										NO. OF CASES			
		MEAN ABS. ERROR	NO. OF CASES	MEAN ABS. ERROR	MEAN FCST	MEAN OBS	NO. OF CASES	SKILL SCORE	PERCENT FCST. CORRECT	BIAS BY CATEGORY							
										CAT1	CAT2	CAT3	CAT4		CAT5	CAT6	CAT7
18	GUIDANCE LOCAL	32	9681	3.2	12.0	11.7	9791	0.29	51	0.71	1.41	0.95	0.69	0.40	0.25	0.10	15327
		35		3.7	13.1			0.26	48	0.70	1.21	1.18	1.09	0.65	0.62	0.62	
30	GUIDANCE LOCAL	34	5378	3.5	10.6	10.5	5497	0.32	61	0.94	1.34	0.61	0.31	0.13	0.04	0.14	15334
		41		4.1	11.9			0.24	55	0.83	1.40	0.95	0.80	0.57	0.52	0.43	
42	GUIDANCE LOCAL	43	9986	3.6	11.3	11.2	10151	0.21	47	0.58	1.71	0.81	0.35	0.15	0.07	0.0	15287
		51		4.2	12.1			0.16	43	0.69	1.46	0.96	0.55	0.31	0.20	0.29	

Table 3. Verification of subjective local and objective guidance surface wind forecasts at 21 stations in the Eastern Region of the NWS during October 1974 through March 1975.

FCST. PROJ (HRS)	TYPE OF FCST	DIRECTION		SPEED (KTS)										NO. OF CASES	NO. OF CASES		
		MEAN ABS. ERROR	NO. OF CASES	MEAN ABS. ERROR	MEAN FCST	MEAN OBS	SKILL SCORE	PERCENT FCST. CORRECT	BIAS BY CATEGORY								
									CAT1	CAT2	CAT3	CAT4	CAT5			CAT6	CAT7
18	GUIDANCE LOCAL	31	2471	3.1	12.2	11.6	0.27	50	0.53	1.45	1.00	0.86	0.40	0.29	*	3465	
		33		3.7	13.2		0.21	44	0.64	1.20	1.14	1.14	1.28	0.57	**		
30	GUIDANCE LOCAL	34	1421	3.2	11.1	10.6	0.38	63	0.87	1.38	0.82	0.57	0.18	0.25	0.0	3477	
		39		3.9	12.3		0.26	55	0.81	1.29	1.18	1.29	0.55	0.50	0.0		
42	GUIDANCE LOCAL	41	2521	3.3	11.6	11.3	0.20	46	0.43	1.69	0.88	0.44	0.23	0.33	*	3468	
		46		3.9	12.3		0.15	41	0.61	1.44	0.92	0.81	0.42	0.0	**		

* Category 7 (> 32 knots) was never forecast or observed.

** Category 7 (> 32 knots) was forecast once, but never was observed.

Table 4. Verification of subjective local and objective guidance surface wind forecasts at 24 stations in the Southern Region of the NWS during October 1974 through March 1975.

FCST. PROJ (HRS)	TYPE OF FCST	DIRECTION		SPEED (KTS)										NO. OF CASES	NO. OF CASES			
		MEAN ABS. ERROR	NO. OF CASES	MEAN ABS. ERROR	MEAN FCST	MEAN OBS	NO. OF CASES	SKILL SCORE	PERCENT FCST. CORRECT	BIAS BY CATEGORY								
										CAT1	CAT2	CAT3	CAT4			CAT5	CAT6	CAT7
18	GUIDANCE LOCAL	35	2844	3.1	11.7	11.3	2871	0.24	50	0.61	1.42	0.97	0.61	0.49	0.23	0.0	4142	
		37		3.5	12.6			0.21	46	0.60	1.26	1.18	1.10	0.49	0.62	0.50		
30	GUIDANCE LOCAL	36	1245	3.3	10.2	10.0	1269	0.30	63	0.99	1.24	0.53	0.07	0.0	0.0	*	4147	
		43		3.8	11.3			0.23	56	0.85	1.40	0.87	0.49	0.29	1.5	*		
42	GUIDANCE LOCAL	46	2897	3.4	10.8	10.8	2940	0.16	46	0.45	1.74	0.76	0.19	0.02	0.0	0.0	4120	
		52		4.0	11.8			0.10	40	0.62	1.47	0.93	0.42	0.19	0.0	0.0		

* Category 7 (> 32 knots) was never forecast or observed.

Table 5. Verification of subjective local and objective guidance surface wind forecasts at 28 stations in the Central Region of the NWS during October 1974 through March 1975.

FCST. PROJ (HRS)	TYPE OF FCST	DIRECTION		SPEED (KTS)										NO. OF CASES	NO. OF CASES		
		MEAN ABS. ERROR	NO. OF CASES	MEAN ABS. ERROR	MEAN FCST	MEAN OBS	SKILL SCORE	PERCENT FCST. CORRECT	BIAS BY CATEGORY								
									CAT1	CAT2	CAT3	CAT4	CAT5			CAT6	CAT7
18	GUIDANCE LOCAL	28	3524	3.2	12.2	12.2	0.26	49	0.65	1.39	1.00	0.68	0.45	0.19	0.14	4903	
		33		3.7	13.2		0.24	46	0.58	1.24	1.20	1.04	0.48	0.63	0.43		
30	GUIDANCE LOCAL	33	2156	3.5	10.6	10.6	0.26	54	0.88	1.46	0.61	0.34	0.13	0.0	0.0	4897	
		42		4.1	11.8		0.18	47	0.72	1.58	0.83	0.70	0.45	0.55	0.50		
42	GUIDANCE LOCAL	42	3772	3.7	11.6	11.6	0.16	43	0.41	1.73	0.87	0.41	0.17	0.03	0.0	4890	
		52		4.3	12.2		0.12	40	0.52	1.53	1.03	0.47	0.24	0.16	0.14		

Table 6. Verification of subjective local and objective guidance surface wind forecasts at 16 stations in the Western Region of the NWS during October 1974 through March 1975.

FCST. PROJ (HRS)	TYPE OF FCST	DIRECTION		SPEED (KTS)										NO. OF CASES			
		MEAN ABS. ERROR	NO. OF CASES	MEAN ABS. ERROR	MEAN FCST	MEAN OBS	NO. OF CASES	SKILL SCORE	PERCENT FCST. CORRECT	CONTINGENCY TABLE							
										CAT1	CAT2	CAT3	CAT4		CAT5	CAT6	CAT7
18	GUIDANCE	38	842	4.0	11.5	12.2	849	0.29	60	0.98	1.37	0.59	0.56	0.20	0.50	0.0	2817
	LOCAL	38		4.3	13.8			0.32	60	0.94	1.06	1.21	1.13	0.63	0.63	1.00	
30	GUIDANCE	37	556	4.1	10.3	11.1	572	0.31	69	1.04	1.19	0.38	0.18	0.14	0.0	**	2813
	LOCAL	43		4.7	12.5			0.27	64	0.95	1.16	1.09	0.76	1.14	0.25	*	
42	GUIDANCE	47	796	4.4	10.8	11.1	816	0.24	56	0.92	1.57	0.53	0.31	0.15	0.10	0.0	2809
	LOCAL	51		5.0	12.4			0.18	53	0.96	1.30	0.84	0.53	0.45	0.70	0.20	

* Category 7 (> 32 knots) was never forecast or observed.

** Category 7 (> 32 knots) was forecast once, but never was observed.

Tab 7. Contingency tables for subjective local and effective surface wind forecasts at 89 stations across the United States During October 1974 through March 1975.

18-Hour Forecasts

30-Hour Forecasts

42-Hour Forecasts

	GUIDANCE FCST							GUIDANCE FCST							GUIDANCE FCST									
	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T
1	2877	2552	198	13	0	0	0	5640	1	6603	2208	94	7	0	0	8912	1	2257	3113	231	6	2	0	5609
2	989	3507	891	58	6	0	0	5451	2	1573	2421	321	18	0	0	4333	2	801	3886	700	37	2	0	5426
3	136	1394	1227	225	14	2	0	2998	3	211	942	350	35	3	0	1542	3	141	1808	918	122	4	0	2993
OBS	4	11	214	452	213	24	1	915	OBS	4	29	213	137	42	4	425	4	24	383	427	90	7	2	933
5	4	32	78	89	34	5	0	242	5	3	28	35	20	4	0	90	5	8	57	115	51	13	1	245
6	0	2	13	28	15	2	0	60	6	0	8	10	6	1	0	25	6	0	11	30	15	4	0	60
7	0	3	2	5	4	5	2	21	7	2	0	1	3	0	1	7	7	1	3	6	6	4	1	21
T	4017	7704	2861	631	97	15	2	15327	T	8421	5820	948	131	12	1	15334	T	3232	9261	2427	327	36	4	15287

	LOCAL FCST							LOCAL FCST							LOCAL FCST										
	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	
1	2760	2345	463	58	12	2	0	5640	1	5682	2777	392	56	2	2	8912	1	2324	2675	537	62	7	1	5609	
2	1004	2989	1237	206	10	3	2	5451	2	1439	2255	521	99	15	4	4333	2	1143	3184	952	133	10	2	5426	
3	187	1080	1329	357	38	6	1	2998	OBS	3	208	859	366	96	13	1542	OBS	3	340	1583	890	157	22	1	2993
4	15	169	431	256	37	6	1	915	4	37	163	153	56	11	4	425	4	62	398	360	100	11	1	933	
5	6	17	71	95	39	10	4	242	5	8	21	28	25	5	2	90	5	11	80	91	46	13	4	245	
6	0	2	11	20	20	6	1	60	6	0	7	8	5	0	0	25	6	1	15	25	10	8	1	60	
7	1	3	1	6	2	4	4	21	7	1	1	2	2	0	1	7	7	3	4	4	4	2	0	21	
T	3973	6605	3543	998	158	37	13	15327	T	7375	6083	1470	339	51	13	15334	T	3884	7939	2859	512	75	12	6	

Tab. 8. Contingency tables for subjective local and collective guidance surface wind forecasts at 21 stations in the Eastern Region of the NWS during October 1974 through March 1975.

18-Hour Forecasts

30-Hour Forecasts

42-Hour Forecasts

	GUIDANCE FCST							GUIDANCE FCST							GUIDANCE FCST										
	1	2	3	4	5	6	T	1	2	3	4	5	6	T	1	2	3	4	5	6	7	T			
1	420	625	60	6	0	0	1111	1	1412	517	29	3	0	0	1961	1	313	721	62	3	2	0	1101		
2	148	868	253	17	2	0	1288	2	261	656	105	10	0	0	1032	2	130	955	192	14	1	0	1292		
3	21	342	360	79	0	0	802	3	27	202	118	14	2	0	363	3	28	439	290	37	0	0	794		
OBS	4	0	34	108	65	6	214	4	0	36	36	20	2	0	94	4	1	65	121	37	2	1	0	227	
5	0	3	18	14	7	1	43	5	0	7	10	5	0	0	22	5	2	2	31	7	5	1	0	48	
6	0	0	1	4	2	0	7	6	0	1	1	2	0	0	4	6	0	1	2	2	1	0	0	6	
7	0	0	0	0	0	0	0	7	0	0	0	0	1	0	1	7	0	0	0	0	0	0	0	0	
T	589	1872	800	185	17	2	3465	T	1700	1419	299	54	4	1	0	3477	T	474	2183	698	100	11	2	0	3468

	LOCAL FCST							LOCAL FCST							LOCAL FCST										
	1	2	3	4	5	6	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T		
1	437	543	118	9	4	0	1111	1	1260	602	83	13	2	1	0	1961	1	364	606	113	18	0	0	1101	
2	228	672	325	56	5	1	1288	2	288	509	191	40	3	1	0	1032	2	222	772	243	46	8	0	1242	
OBS	3	39	288	355	105	14	802	3	29	187	106	37	4	0	0	363	3	76	390	256	65	7	0	794	
4	2	32	102	59	19	0	214	4	6	23	40	23	2	0	0	94	4	9	80	97	40	1	0	227	
5	1	5	13	14	8	2	43	5	3	5	7	6	1	0	0	22	5	1	14	16	14	3	0	48	
6	0	0	1	1	5	0	7	6	0	2	0	2	0	0	4	6	0	0	5	0	1	0	6		
7	0	0	0	0	0	0	0	7	0	0	1	0	0	0	1	7	0	0	0	0	0	0	0		
T	707	1540	914	244	55	4	3465	T	1586	1328	428	121	12	2	0	3477	T	672	1862	730	183	20	0	1	3468

Tab 9. Contingency tables for subjective local and objective guidance surface wind forecasts at 24 stations in the Southern Region of the NWS during October 1974 through March 1975.

18-Hour Forecasts

30-Hour Forecasts

42-Hour Forecasts

18-Hour Forecasts										30-Hour Forecasts										42-Hour Forecasts									
GUIDANCE FCST										GUIDANCE FCST										GUIDANCE FCST									
1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T						
1	569	772	53	2	0	0	1396	1	1934	555	31	1	0	0	2521	1	393	949	45	1	0	0	1388						
2	253	1115	262	19	2	0	1651	2	496	610	63	1	0	0	1170	2	207	1234	180	6	0	0	1627						
3	26	402	320	51	6	2	807	3	59	235	66	1	0	0	361	3	18	530	240	21	0	0	809						
OBS	4	0	48	125	48	9	230	OBS	4	8	48	28	2	0	86	OBS	4	3	99	118	13	1	234						
5	0	9	15	17	2	0	43	5	1	2	3	1	0	0	7	5	0	20	25	2	0	0	47						
6	0	2	5	3	2	1	13	6	0	2	0	0	0	0	2	6	0	6	5	2	0	0	13						
7	0	1	1	0	0	0	2	7	0	0	0	0	0	0	0	7	0	1	1	0	0	0	2						
T	848	2349	781	140	21	3	4142	T	2498	1452	191	6	0	0	4147	T	621	2839	614	45	1	0	4120						

18-Hour Forecasts										30-Hour Forecasts										42-Hour Forecasts									
LOCAL FCST										LOCAL FCST										LOCAL FCST									
1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T						
1	509	746	124	13	4	0	1396	1	1643	765	102	11	0	0	2521	1	413	830	130	10	3	0	1388						
2	277	967	361	46	0	0	1651	2	434	618	103	12	1	2	1170	2	330	998	273	26	0	0	1627						
OBS	3	43	309	341	105	6	807	OBS	3	56	220	72	13	0	361	OBS	3	95	451	229	31	3	809						
4	2	46	108	67	5	2	230	4	9	36	34	5	1	1	86	4	17	100	95	20	2	0	234						
5	0	3	17	16	4	2	43	5	1	2	3	1	0	0	7	5	1	15	22	9	0	0	47						
6	0	1	4	5	2	1	13	6	0	1	1	0	0	0	2	6	0	4	6	2	1	0	13						
7	0	1	0	1	0	0	2	7	0	0	0	0	0	0	0	7	0	1	0	1	0	0	2						
T	831	2073	955	253	21	8	4142	T	2143	1642	315	42	2	3	4147	T	856	2399	755	99	9	0	4120						

Table 10. Contingency tables for subjective local and objective guidance surface wind forecasts at 28 stations in the Central Region of the NWS during October 1974 through March 1975.

18-Hour Forecasts

30-Hour Forecasts

42-Hour Forecasts

	GUIDANCE FCST							GUIDANCE FCST							GUIDANCE FCST									
	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T
1	597	779	65	4	0	0	0	1445	1	1608	855	32	3	0	0	2498	1	366	971	100	2	0	0	1439
2	284	1202	330	16	1	0	0	1833	2	500	900	127	6	0	0	1533	2	178	1352	287	15	0	0	1832
OBS	3	45	477	498	82	6	0	1108	OBS	3	86	391	140	17	1	635	3	31	667	348	55	3	0	1104
4	4	89	182	78	8	0	0	361	4	9	78	63	15	2	167	4	5	165	162	32	3	0	367	
5	3	7	34	43	22	1	0	110	5	1	14	19	10	3	47	5	3	19	45	31	5	0	103	
6	0	0	4	18	9	1	0	32	6	0	1	7	3	0	11	6	0	3	17	9	2	0	31	
7	0	1	0	3	4	4	2	14	7	2	0	1	3	0	6	7	0	1	3	5	4	1	14	
T	933	2555	1113	244	50	6	2	4903	T	2206	2239	389	57	6	0	4897	T	583	3178	962	149	17	1	4890

LOCAL FCST

LOCAL FCST

LOCAL FCST

	LOCAL FCST							LOCAL FCST							LOCAL FCST										
	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	
1	537	729	148	28	2	1	0	1445	1	1261	1073	145	17	0	1	2498	1	394	797	224	21	1	1	1439	
2	240	1080	437	71	3	2	0	1833	2	452	888	162	25	6	0	1533	2	262	1157	369	41	1	1	1832	
OBS	3	52	390	532	120	13	1	1108	OBS	3	77	374	145	33	6	635	OBS	3	73	621	348	53	8	1	1104
4	8	67	178	97	8	3	0	361	4	13	67	59	23	2	167	4	16	178	138	31	4	0	367		
5	3	6	33	44	17	5	2	110	5	2	11	12	16	3	47	5	4	36	39	19	4	1	103		
6	0	1	5	12	9	4	1	32	6	0	3	3	1	4	11	6	0	9	12	6	4	0	14		
7	0	1	0	5	1	4	3	14	7	1	1	1	2	0	6	7	0	3	4	3	1	0	14		
T	840	2274	1333	377	53	20	6	4903	T	1806	2417	527	117	21	6	4897	T	749	2801	1134	174	25	5	4890	

Table 11: Contingency tables for subjective local and objective guidance surface wind forecasts at 16 stations in the Western Region of the NWS during October 1974 through March 1975.

18-Hour Forecasts

30-Hour Forecasts

42-Hour Forecasts

	GUIDANCE FCST							GUIDANCE FCST							GUIDANCE FCST									
	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T
1 1291	376	20	1	0	0	0	1688	1 1649	281	2	0	0	0	0	1932	1 1185	472	24	0	0	0	0	1681	
2 304	322	46	6	1	0	0	679	2 316	255	26	1	0	0	0	598	2 286	345	41	2	1	0	0	675	
3 44	173	49	13	2	0	0	281	3 39	114	26	3	0	0	1	183	3 64	172	40	9	1	0	0	286	
OBS	4 7	43	37	22	1	0	110	OBS	4 12	51	10	5	0	0	78	OBS	4 15	54	26	8	1	1	0	105
5 1	13	11	15	3	3	0	46	5 1	5	3	4	1	0	0	14	5 3	16	14	11	3	0	0	47	
6 0	0	3	3	2	0	0	8	6 0	4	2	1	1	0	0	8	6 0	1	6	2	1	0	0	10	
7 0	1	1	2	0	1	0	5	7 0	0	0	0	0	0	0	0	7 1	1	2	1	0	0	0	5	
T 1647	928	167	62	9	4	0	2817	T 2017	710	69	14	2	0	1	2813	T 1554	1061	153	33	7	1	0	2809	

	LOCAL FCST							LOCAL FCST							LOCAL FCST								
	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7	T	1	2	3	4	5	6	7
1 1277	327	73	8	2	1	0	1688	1 1518	337	62	15	0	0	0	1932	1 1153	442	70	13	3	0	0	1681
2 259	270	114	33	2	0	1	679	2 265	240	65	22	5	1	0	598	2 329	257	67	20	1	1	0	675
OBS	3 53	93	101	27	5	1	281	OBS	3 46	78	43	13	3	0	183	OBS	3 96	121	57	8	4	0	286
4 3	24	43	33	5	1	1	110	4 9	37	20	5	6	1	0	78	4 20	40	30	9	4	1	1	105
5 2	3	8	21	10	1	1	46	5 2	3	6	2	1	0	0	14	5 5	15	14	4	6	3	0	47
6 0	0	1	2	4	1	0	8	6 0	1	4	2	1	0	0	8	6 1	2	2	2	2	1	0	10
7 1	1	1	0	1	0	1	5	7 0	0	0	0	0	0	0	0	7 3	0	0	0	0	1	1	5
T 1595	718	341	124	29	5	5	2817	T 1840	696	200	59	16	2	0	2813	T 1607	877	240	56	21	7	1	2809